



# STIC Search Report

EIC 1700

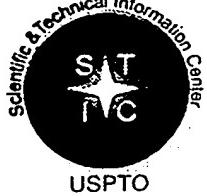
STIC Database Tracking Number: 14575

**TO:** Sanza McClendon  
**Location:** REM 10D70  
**Art Unit :** 1711  
**March 3, 2005**

**Case Serial Number:** 10/712589

**From:** Kathleen Fuller  
**Location:** EIC 1700  
REMSEN 4B28  
**Phone:** 571/272-2505  
**Kathleen.Fuller@uspto.gov**

## Search Notes



# STIC Search Results Feedback Form

EIC17000

Questions about the scope or the results of the search? Contact **the EIC searcher or contact:**

Kathleen Fuller, EIC 1700 Team Leader  
571/272-2505 REMSEN 4B28

## Voluntary Results Feedback Form

- *I am an examiner in Workgroup:*  Example: 1713
- *Relevant prior art found, search results used as follows:*
- 102 rejection
  - 103 rejection
  - Cited as being of interest.
  - Helped examiner better understand the invention.
  - Helped examiner better understand the state of the art in their technology.

*Types of relevant prior art found:*

- Foreign Patent(s)
- Non-Patent Literature  
(journal articles, conference proceedings, new product announcements etc.)

➤ *Relevant prior art not found:*

- Results verified the lack of relevant prior art (helped determine patentability).
- Results were not useful in determining patentability or understanding the invention.

**Comments:**

Drop off or send completed forms to EIC1700 REMSEN 4B28



=> FILE REG  
FILE 'REGISTRY' ENTERED AT 12:05:25 ON 03 MAR 2005  
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STRUCTURE FILE UPDATES: 1 MAR 2005 HIGHEST RN 840454-17-3  
DICTIONARY FILE UPDATES: 1 MAR 2005 HIGHEST RN 840454-17-3

TSCA INFORMATION NOW CURRENT THROUGH JANUARY 18, 2005

Please note that search-term pricing does apply when conducting SmartSELECT searches.

Crossover limits have been increased. See HELP CROSSOVER for details.

Experimental and calculated property data are now available. For more information enter HELP PROP at an arrow prompt in the file or refer to the file summary sheet on the web at:  
<http://www.cas.org/ONLINE/DBSS/registryss.html>

=> FILE HCAPLU  
FILE 'HCAPLUS' ENTERED AT 12:05:30 ON 03 MAR 2005  
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FILE COVERS 1907 - 3 Mar 2005 VOL 142 ISS 10  
FILE LAST UPDATED: 2 Mar 2005 (20050302/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

=> D QUE

L4	148391	SEA FILE=REGISTRY ABB=ON	46.492.16/RID
L5	1240	SEA FILE=REGISTRY ABB=ON	L4 AND 8-50/F
L6	96	SEA FILE=REGISTRY ABB=ON	L5 AND 1-2/S AND 3-20/O
L7	40	SEA FILE=HCAPLUS ABB=ON	L6
L9	0	SEA FILE=HCAPLUS ABB=ON	L7 AND ELECTROLYT?
L10	0	SEA FILE=HCAPLUS ABB=ON	L7 AND ELECTROLYT?
L11	100102	SEA FILE=HCAPLUS ABB=ON	L4
L12	724	SEA FILE=HCAPLUS ABB=ON	L11 AND ELECTROLYT?
L13	48	SEA FILE=HCAPLUS ABB=ON	L12 AND MEMBRANE?
L14	7	SEA FILE=HCAPLUS ABB=ON	L13 AND ?FLUORI?

L15	9 SEA FILE=HCAPLUS ABB=ON	L13 AND ?FLUORO?
L16	11 SEA FILE=HCAPLUS ABB=ON	L14 OR L15
L17	55 SEA FILE=HCAPLUS ABB=ON	L12 AND ?NITRIL?
L18	1 SEA FILE=HCAPLUS ABB=ON	L17 AND ?TRIMER?
L19	938 SEA FILE=HCAPLUS ABB=ON	?TRIMER?(4A)?NITRIL?
L20	126 SEA FILE=HCAPLUS ABB=ON	L11 AND L19
L21	0 SEA FILE=HCAPLUS ABB=ON	L20 AND (MEMBRANE? OR ELECTROLYT?)
L22	44 SEA FILE=HCAPLUS ABB=ON	L20 AND (POLYMER? OR PLASTIC?)/SC, SX, A B, BI
L23	9 SEA FILE=HCAPLUS ABB=ON	L22 AND (?FLUORO? OR ?FLUORI?)
L24	21 SEA FILE=HCAPLUS ABB=ON	L9 OR L10 OR L16 OR L18 OR L21 OR L23
 L27	707161 SEA FILE=REGISTRY ABB=ON	(C(L)F(L)S(L)O)/ELS
L31	72307 SEA FILE=HCAPLUS ABB=ON	?NITRIL?(L)RCT/RL
L35	288702 SEA FILE=REGISTRY ABB=ON	L27 AND SULFON?
L36	86049 SEA FILE=HCAPLUS ABB=ON	L35
L37	12 SEA FILE=HCAPLUS ABB=ON	L36 AND L19
L38	5167 SEA FILE=HCAPLUS ABB=ON	L31 AND L35
L39	56 SEA FILE=HCAPLUS ABB=ON	L38 AND ELECTROLYT?
L40	6 SEA FILE=HCAPLUS ABB=ON	L39 AND MEMBRANE?
L41	9 SEA FILE=HCAPLUS ABB=ON	L39 AND CROSSLINK?
L42	3463 SEA FILE=HCAPLUS ABB=ON	L11 AND L36
L43	126 SEA FILE=HCAPLUS ABB=ON	L42 AND L31
L44	1 SEA FILE=HCAPLUS ABB=ON	L43 AND ELECTROLYT?
L45	2 SEA FILE=HCAPLUS ABB=ON	L43 AND CROSSLINK?
L46	3 SEA FILE=HCAPLUS ABB=ON	L43 AND MEMBRANE?
L47	30 SEA FILE=HCAPLUS ABB=ON	L37 OR L40 OR L41 OR (L44 OR L45 OR L46)
L48	50 SEA FILE=HCAPLUS ABB=ON	L47 OR L24
L51	37 SEA FILE=HCAPLUS ABB=ON	L48 AND (POLYMER? OR PLASTIC?)/SC, SX, A B, BI

=> D L51 BIB ABS HITIND HITSTR 1-37

L51 ANSWER 1 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 2004:704217 HCAPLUS  
 DN 141:367031  
 TI Radiation-grafted solid polymer electrolyte  
**membrane**: Studies of fluorinated ethylene propylene  
 (FEP) copolymer-g-acrylic acid grafted **membranes** and their  
 sulfonated derivatives  
 AU Patri, M.; Hande, V. R.; Phadnis, Swati; Deb, P. C.  
 CS Naval Materials Research Laboratory, Ambernath, 421 506, India  
 SO Polymers for Advanced Technologies (2004), 15(8), 485-489  
 CODEN: PADTE5; ISSN: 1042-7147  
 PB John Wiley & Sons Ltd.  
 DT Journal  
 LA English  
 AB Acrylic acid was grafted onto FEP by simultaneous radiation technique and  
 the resulting **membranes** were sulfonated. Results of dynamic  
 mech. properties of the **membranes** showed that storage modulus  
 and temperature at tan δ(max) increases on grafting. X-ray diffraction  
 (XRD) anal. of the grafted and sulfonated **membranes** showed  
 decreasing trend in crystallinity with increase in degree of grafting.  
 From SEM studies it was confirmed that grafting takes place by the front  
 mechanism.  
 CC 38-3 (**Plastics** Fabrication and Uses)  
 Section cross-reference(s): 35

ST acrylic acid grafted **fluorinated** ethylene propylene copolymer  
membrane sulfonated; dynamic mech property crystallinity  
membrane

IT **Polymerization**  
(graft, radiochem.; radiation-grafted solid **polymer**  
**electrolyte membranes**)

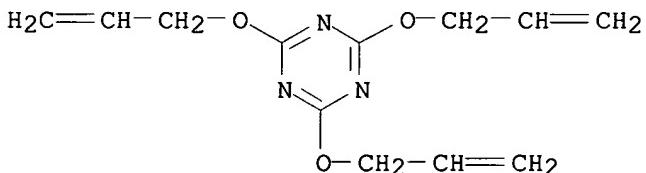
IT Crystallinity  
Glass transition temperature  
**Membranes**, nonbiological  
**Polymer** morphology  
Storage modulus  
Sulfonation  
(radiation-grafted solid **polymer electrolyte**  
**membranes**)

IT Complex modulus  
(tan δ; radiation-grafted solid **polymer**  
**electrolyte membranes**)

IT 79-10-7DP, Acrylic acid, grafted onto **fluorinated** ethylene propylene copolymer, then sulfonated 101-37-1DP, Triallyl cyanurate, reaction products with acrylic acid and **fluorinated** ethylene propylene copolymer, then sulfonated 9010-79-1DP, Ethylene-propylene copolymer, **fluorinated**, acrylic acid grafted, then sulfonated  
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(radiation-grafted solid **polymer electrolyte**  
**membranes**)

IT 101-37-1DP, Triallyl cyanurate, reaction products with acrylic acid and **fluorinated** ethylene propylene copolymer, then sulfonated  
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(radiation-grafted solid **polymer electrolyte**  
**membranes**)

RN 101-37-1 HCAPLUS  
CN 1,3,5-Triazine, 2,4,6-tris(2-propenyoxy)- (9CI) (CA INDEX NAME)



RE.CNT 23 THERE ARE 23 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

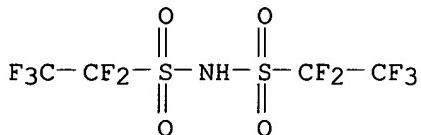
L51 ANSWER 2 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
AN 2004:609801 HCAPLUS  
DN 141:126391  
TI Method of fabrication of electrode for secondary battery having intrinsic  
**polymer electrolyte**  
IN Ohsawa, Yasuhiko; Hisamitsu, Yasunari  
PA Nissan Motor Co., Ltd., Japan  
SO U.S. Pat. Appl. Publ., 11 pp.  
CODEN: USXXCO  
DT Patent  
LA English  
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004146781 JP 2004234879 EP 1443574	A1 A2 A1	20040729 20040819 20040804	US 2003-733286 JP 2003-18632 EP 2003-28736	20031212 20030128 20031212
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
PRAI	JP 2003-18632	A	20030128		
AB	A secondary battery electrode comprises a collector, and an active material layer formed on the collector. Further, the active material layer comprises first active material layer components including an electrode active material, binder and first polar <b>polymer</b> , and second active material layer components including a second polar <b>polymer</b> , and being placed in voids between the first active material layer components. The secondary battery electrode is used in a secondary battery having an intrinsic <b>polymer electrolyte</b> .				
IC	ICM H01M004-02 ICS H01M004-62				
NCL	429209000; 429217000; 429210000				
CC	52-2 (Electrochemical, Radiational, and Thermal Energy Technology) Section cross-reference(s): 38				
ST	electrode secondary battery intrinsic <b>polymer electrolyte</b>				
IT	Fluoropolymers, uses RL: MOA (Modifier or additive use); USES (Uses) (binder; method of fabrication of electrode for secondary battery having intrinsic <b>polymer electrolyte</b> )				
IT	Secondary batteries (lithium; method of fabrication of electrode for secondary battery having intrinsic <b>polymer electrolyte</b> )				
IT	Battery cathodes Battery <b>electrolytes</b> <b>Polymer electrolytes</b> (method of fabrication of electrode for secondary battery having intrinsic <b>polymer electrolyte</b> )				
IT	Carbonaceous materials (technological products) Polyethers, uses RL: DEV (Device component use); USES (Uses) (method of fabrication of electrode for secondary battery having intrinsic <b>polymer electrolyte</b> )				
IT	Membranes, nonbiological ( <b>polymer</b> ; method of fabrication of electrode for secondary battery having intrinsic <b>polymer electrolyte</b> )				
IT	9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 24937-79-9, Pvdf RL: MOA (Modifier or additive use); USES (Uses) (binder; method of fabrication of electrode for secondary battery having intrinsic <b>polymer electrolyte</b> )				
IT	7439-93-2, Lithium, uses 7782-42-5, Graphite, uses 132843-44-8 RL: DEV (Device component use); USES (Uses) (method of fabrication of electrode for secondary battery having intrinsic <b>polymer electrolyte</b> )				
IT	78-67-1, Azobisisobutyronitrile 24650-42-8 RL: RCT (Reactant); RACT (Reactant or reagent) ( <b>polymerization initiator</b> ; method of fabrication of electrode for secondary battery having intrinsic <b>polymer electrolyte</b> )				
IT	132843-44-8				

RL: DEV (Device component use); USES (Uses)  
 (method of fabrication of electrode for secondary battery having  
 intrinsic **polymer electrolyte**)

RN 132843-44-8 HCPLUS

CN Ethanesulfonamide, 1,1,2,2,2-pentafluoro-N-[(pentafluoroethyl)sulfonyl]-,  
 lithium salt (9CI) (CA INDEX NAME)



● Li

L51 ANSWER 3 OF 37 HCPLUS COPYRIGHT 2005 ACS on STN

AN 2004:431502 HCPLUS

DN 141:126244

TI Proton Conductive Polyimide **Electrolytes** Containing Fluorenyl Groups: Synthesis, Properties, and Branching Effect

AU Miyatake, Kenji; Zhou, Hua; Watanabe, Masahiro

CS Clean Energy Research Center, University of Yamanashi, Kofu, 400-8510, Japan

SO Macromolecules (2004), 37(13), 4956-4960

CODEN: MAMOBX; ISSN: 0024-9297

PB American Chemical Society

DT Journal

LA English

AB Novel sulfonated polyimide copolymers as **electrolytes** for high-temperature fuel cell applications are reported. Sulfonated polyimide copolymers (SPIH-X; X refers to molar percentage of fluorenyl content) containing 0-60 mol % of fluorenyl groups as hydrophobic component were synthesized, of which **electrolyte** properties were studied and compared to those of the **perfluorinated** ionomer (Nafion 112).

High-mol.-weight copolymers with good film-forming capability were obtained. Thermal stability with decomposition temperature of ca. 280 °C and no glass transition temperature was confirmed for the copolymers. SPIH shows unique water uptake behavior with the maximum value of 57% at X = 30. Water mols. absorbed in the **electrolyte membrane** with this

specific composition do not evaporate easily so that the high proton conductivity of 1.67

S cm<sup>-1</sup> was obtained at 120° and 100% RH. The branching and crosslinking of SPIH-30 were carried out by applying 2 mol % of trifunctional monomer (melamine) in the **polymerization** and by electron beam irradiation upon the **membrane**. The branching and crosslinking are effective to improve oxidative stability and mech. strength. Although the proton conductivity decreases slightly by the branching and crosslinking,

it

still remains at the comparable level to that of Nafion 112.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 35, 38, 72, 76

ST proton conductive polyimide **electrolyte** fluorenyl group branching sulfonated **membrane**; fuel cell separator **membrane** polyelectrolyte arom polyimide mech strength

- IT Polyimides, uses  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(fluorene group- and **fluorine**-containing, cardo, aryl, sulfonate-containing; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT Polyoxyalkylenes, uses  
RL: DEV (Device component use); USES (Uses)  
(**fluorine**- and sulfo-containing, ionomers, electrode binder; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT Current density  
(from methanol crossover, voltage and humidity effect on; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT Electric current-potential relationship  
(of assembled fuel cell; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT Stability  
(oxidative; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT Carbon fibers, uses  
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)  
(paper, anode support; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT **Fluoropolymers**, uses  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(polyimide-, fluorene group-containing, cardo, aryl, sulfonate-containing; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT Cardo **polymers**  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(polyimides, fluorene group- and **fluorine**-containing, aryl, sulfonate-containing; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT **Fluoropolymers**, uses  
RL: DEV (Device component use); USES (Uses)  
(polyoxyalkylene-, sulfo-containing, ionomers, electrode binder; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT Ionomers  
RL: DEV (Device component use); USES (Uses)  
(polyoxyalkylenes, **fluorine**- and sulfo-containing, electrode binder; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT Ion exchange **membranes**  
(preparation and ion exchange capacity of; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes**)

containing **trifluoromethyl** groups)

IT Ionic conductivity  
(proton; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT Crosslinking  
(radiochem.; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT Fuel cell separators  
Fuel cells  
    **Membrane** electrodes  
    **Membranes**, nonbiological

Polyelectrolytes  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT Carbon black, uses  
RL: DEV (Device component use); USES (Uses)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT **Fluoropolymers**, uses  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT 117-61-3P, 4,4'-Diamino-2,2'-biphenyldisulfonic acid  
RL: PUR (Purification or recovery); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
(DAPS; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT 15499-84-0, 4,4'-(9-Fluorenylidene)dianiline  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(FDA; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT 7732-18-5, Water, processes  
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYR (Physical process); PROC (Process)  
(absorption of; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT 7720-78-7, Ferrous sulfate  
RL: CAT (Catalyst use); USES (Uses)  
(for oxidative stability; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT 500783-35-7P  
RL: PRP (Properties); PUR (Purification or recovery); SPN (Synthetic preparation); PREP (Preparation)  
(plain and crosslinked; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT 42615-02-1  
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)  
(synthesis, properties, and DMFC performance of proton conductive

polyimide **electrolytes** containing **trifluoromethyl** groups)

IT 67-56-1, Methanol, uses  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT 7440-06-4, Platinum, uses 7440-57-5, Gold, uses  
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT 108-39-4, m-Cresol, uses  
RL: NUU (Other use, unclassified); USES (Uses)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT 481001-37-0P **724457-95-8P**  
RL: PRP (Properties); PUR (Purification or recovery); SPN (Synthetic preparation); PREP (Preparation)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT 163294-14-2, Nafion 112  
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT 65-85-0, Benzoic acid, reactions 81-30-1, 1,4,5,8-Naphthalenetetracarboxylic dianhydride **108-78-1**, Melamine, reactions 121-44-8, Triethylamine, reactions 7722-84-1, Hydrogen peroxide, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT **724457-95-8P**  
RL: PRP (Properties); PUR (Purification or recovery); SPN (Synthetic preparation); PREP (Preparation)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

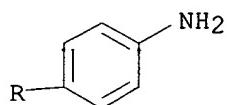
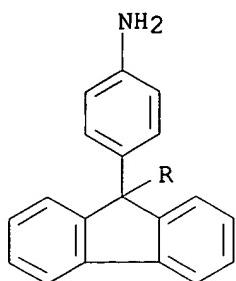
RN 724457-95-8 HCPLUS

CN [1,1'-Biphenyl]-2,2'-disulfonic acid, 4,4'-diamino-, compd. with N,N-diethylethanamine (1:2), polymer with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetron, 4,4'-(9H-fluoren-9-ylidene)bis[benzenamine] and 1,3,5-triazine-2,4,6-triamine (9CI) (CA INDEX NAME)

CM 1

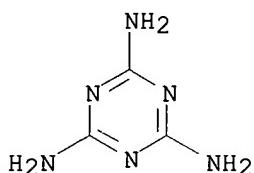
CRN 15499-84-0

CMF C25 H20 N2



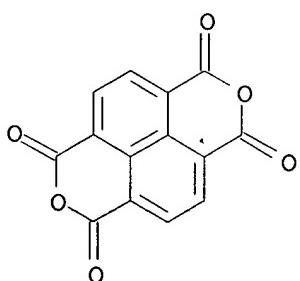
CM 2

CRN 108-78-1  
CMF C3 H6 N6



CM 3

CRN 81-30-1  
CMF C14 H4 O6

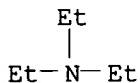


CM 4

CRN 481001-36-9  
CMF C12 H12 N2 O6 S2 . 2 C6 H15 N

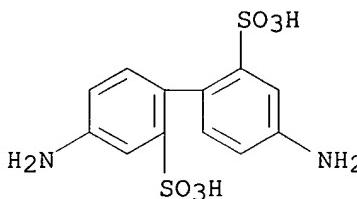
CM 5

CRN 121-44-8  
CMF C6 H15 N



CM 6

CRN 117-61-3  
CMF C12 H12 N2 O6 S2

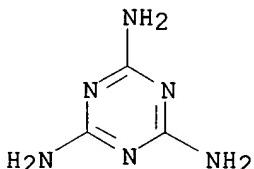


IT 108-78-1, Melamine, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

RN 108-78-1 HCAPLUS

CN 1,3,5-Triazine-2,4,6-triamine (9CI) (CA INDEX NAME)



RE.CNT 26 THERE ARE 26 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L51 ANSWER 4 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
AN 2004:415005 HCAPLUS

DN 141:126239

TI Proton Conductive Polyimide **Electrolytes** Containing **Trifluoromethyl** Groups: Synthesis, Properties, and DMFC Performance

AU Miyatake, Kenji; Zhou, Hua; Matsuo, Takashi; Uchida, Hiroyuki; Watanabe, Masahiro

CS Clean Energy Research Center, University of Yamanashi, Kofu, 400-8510, Japan

SO Macromolecules (2004), 37(13), 4961-4966  
CODEN: MAMOBX; ISSN: 0024-9297

PB American Chemical Society

DT Journal

LA English

AB Sulfonated polyimide copolymers (FSPIH-X; X refers to molar percentage of bis(**trifluoromethyl**)biphenylene content) with X from 0 to 60 mol % were synthesized, of which **electrolyte** properties were studied and compared to those of the **perfluorinated** ionomer (Nafion 112). FSPIH-X **membranes** are thermally stable with no glass transition temperature observed below the decomposition temperature (280°).

Oxidative

stability of the **membranes** is improved with an increase in the content of **trifluoromethyl** substituents in the copolymer structure. FSPIH-60 endured for >9 h in Fenton's reagent at 80°. Bis(**trifluoromethyl**)biphenylene groups with the mol. size of 6.1 Å make each **polymer** chain sep. and produce space to hold water mols. despite their hydrophobic property so that the maximum water uptake was observed for FSPIH-20. Unlike the fluorene groups containing polyimides (SPIH-X), a strong water confinement effect was not obtained for FSPIH-X. The optimum composition of bis(**trifluoromethyl**)biphenylene groups was 30 mol %, and the FSPIH-30 **membrane** showed higher proton conductivity than 0.2 S cm<sup>-1</sup> at 30-140°. A direct methanol fuel cell (DMFC) using FSPIH-30 **membrane** revealed that the methanol crossover through the **membrane** equivalent to the c.d. of methanol oxidation at cathode (*j*(MeOH)) is 64 mA/cm<sup>2</sup> and merely 30% of that of Nafion 112 at open-circuit potential. A terminal voltage of 0.38 V was obtained at 200 mA/cm<sup>2</sup> by the operation at 80 and 90° with supplying dry and humidified oxygen.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 35, 38, 72, 76

ST proton conductive arom polyimide polyelectrolyte **trifluoromethyl** group; methanol fuel cell separator ionic cond methanol crossover modulus

IT Polyimides, uses

RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(aromatic, **fluorine**-containing, **trifluoromethyl**-, sulfonate-containing; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT Polyoxyalkylenes, uses

RL: DEV (Device component use); USES (Uses)  
(**fluorine**- and sulfo-containing, ionomers, electrode binder; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT Current density

(from methanol crossover, voltage and humidity effect on; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT Electric current-potential relationship

(of assembled fuel cell; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT Stability

(oxidative; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT Carbon fibers, uses

RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)

(paper, anode support; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT **Fluoropolymers**, uses  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(polyimide-, aromatic, **trifluoromethyl**-, sulfonate-containing; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT **Fluoropolymers**, uses  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(polyimide-, **trifluoromethyl** group-containing, aryl, sulfonate-containing; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT **Fluoropolymers**, uses  
RL: DEV (Device component use); USES (Uses)  
(polyoxyalkylene-, sulfo-containing, ionomers, electrode binder; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT Ionomers  
RL: DEV (Device component use); USES (Uses)  
(polyoxyalkylenes, **fluorine**- and sulfo-containing, electrode binder; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT Ion exchange **membranes**  
(preparation and ion exchange capacity of; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT Ionic conductivity  
(proton; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT Fuel cell separators  
Fuel cells  
**Membrane** electrodes  
**Membranes**, nonbiological  
Polyelectrolytes  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT Carbon black, uses  
RL: DEV (Device component use); USES (Uses)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT **Fluoropolymers**, uses  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)

IT Polyimides, uses  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(**trifluoromethyl** group-containing, aryl, sulfonate-containing;

- synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT 7732-18-5, Water, processes  
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); PROC (Process)  
(absorption of; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT 7720-78-7, Ferrous sulfate  
RL: CAT (Catalyst use); USES (Uses)  
(for oxidative stability; synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT 42615-02-1  
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT 67-56-1, Methanol, uses  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT 7440-06-4, Platinum, uses 7440-57-5, Gold, uses  
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT 108-39-4, m-Cresol, uses  
RL: NUU (Other use, unclassified); USES (Uses)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT 724457-50-5P 724457-51-6P 724457-52-7P  
RL: PRP (Properties); PUR (Purification or recovery); SPN (Synthetic preparation); PREP (Preparation)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT 163294-14-2, Nafion 112  
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT 117-61-3P, 4,4'-Diamino-2,2'-biphenyldisulfonic acid 341-58-2P,  
2,2'-Bis(**trifluoromethyl**)benzidine  
RL: PUR (Purification or recovery); RCT (Reactant); PREP (Preparation);  
RACT (Reactant or reagent)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl** groups)
- IT 65-85-0, Benzoic acid, reactions 81-30-1, 1,4,5,8-  
Naphthalenetetracarboxylic dianhydride 108-45-2, m-Phenylenediamine,  
reactions 108-78-1, Melamine, reactions 121-44-8,

Triethylamine, reactions 7722-84-1, Hydrogen peroxide, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(synthesis, properties, and DMFC performance of proton conductive  
polyimide **electrolytes** containing **trifluoromethyl**  
groups)

IT 724457-51-6P

RL: PRP (Properties); PUR (Purification or recovery); SPN (Synthetic  
preparation); PREP (Preparation)  
(synthesis, properties, and DMFC performance of proton conductive  
polyimide **electrolytes** containing **trifluoromethyl**  
groups)

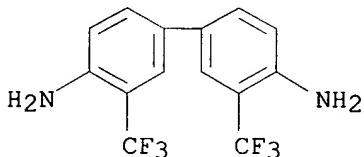
RN 724457-51-6 HCPLUS

CN [1,1'-Biphenyl]-2,2'-disulfonic acid, 4,4'-diamino-, compd. with  
N,N-diethylethanamine (1:2), polymer with 1,3-benzenediamine,  
[2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone,  
3,3'-bis(trifluoromethyl)[1,1'-biphenyl]-4,4'-diamine and  
1,3,5-triazine-2,4,6-triamine (9CI) (CA INDEX NAME)

CM 1

CRN 346-88-3

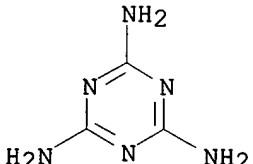
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CM 2

CRN 108-78-1

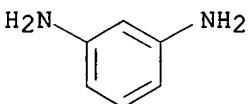
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CM 3

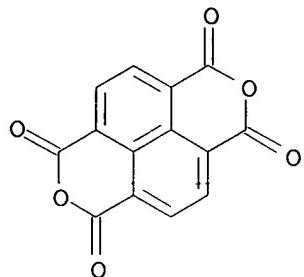
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CMF C6 H8 N2



CM 4

CRN 81-30-1  
CMF C14 H4 O6

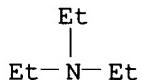


CM 5

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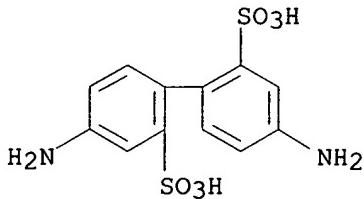
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CRN 121-44-8  
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CM 7

CRN 117-61-3  
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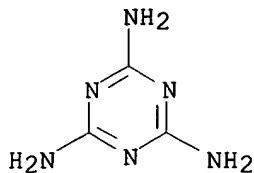


IT 108-78-1, Melamine, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)  
(synthesis, properties, and DMFC performance of proton conductive polyimide **electrolytes** containing **trifluoromethyl groups**)

RN 108-78-1 HCPLUS

CN 1,3,5-Triazine-2,4,6-triamine (9CI) (CA INDEX NAME)



RE.CNT 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L51	ANSWER 5 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN				
AN	2004:161244 HCAPLUS				
DN	140:202430				
TI	Salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials				
IN	Armand, Michel; Michot, Christophe; Gauthier, Michel; Choquette, Yves				
PA	Hydro-Quebec, Can.; Centre National De La Recherche Scientifique (CNRS)				
SO	Eur. Pat. Appl., 33 pp.				
	CODEN: EPXXDW				
DT	Patent				
LA	French				
FAN.CNT	5				
PI	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1391952		A2	20040225	EP 2003-292436	19971230
R: DE, FR, GB, IT					
CA 2194127		AA	19980630	CA 1996-2194127	19961230
CA 2199231		AA	19980905	CA 1997-2199231	19970305
EP 850933		A1	19980701	EP 1997-403188	19971230
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO					
EP 889863		A2	19990113	EP 1997-951051	19971230
EP 889863		B1	20030507		
R: DE, FR, GB, IT					
EP 890176		A1	19990113	EP 1997-951052	19971230
EP 890176		B1	20010620		
R: DE, FR, GB, IT					
JP 2000508114		T2	20000627	JP 1998-529517	19971230
JP 2000508346		T2	20000704	JP 1998-529516	19971230
JP 2000508676		T2	20000711	JP 1998-529514	19971230
JP 2000508677		T2	20000711	JP 1998-529515	19971230
JP 2000508678		T2	20000711	JP 1998-529518	19971230
JP 2002514245		T2	20020514	JP 1998-529513	19971230
US 6120696		A	20000919	US 1998-125792	19980828
US 6171522		B1	20010109	US 1998-101811	19981119
US 6333425		B1	20011225	US 1998-101810	19981119
US 6228942		B1	20010508	US 1998-125798	19981202
US 6395367		B1	20020528	US 1998-125799	19981202
US 6319428		B1	20011120	US 1998-125797	19981203
US 6365068		B1	20020402	US 2000-609362	20000630
US 6576159		B1	20030610	US 2000-638793	20000809
US 2001024749		A1	20010927	US 2001-826941	20010406
US 6506517		B2	20030114		
US 2002009650		A1	20020124	US 2001-858439	20010516
US 2002102380		A1	20020801	US 2002-107742	20020327

US 6835495	B2	20041228		
US 2003052310	A1	20030320	US 2002-253035	20020924
US 2003066988	A1	20030410	US 2002-253970	20020924
PRAI CA 1996-2194127	A	19961230		
CA 1997-2199231	A	19970305		
EP 1997-403188	A3	19971230		
WO 1997-CA1008	W	19971230		
WO 1997-CA1009	W	19971230		
WO 1997-CA1010	W	19971230		
WO 1997-CA1011	W	19971230		
WO 1997-CA1012	W	19971230		
WO 1997-CA1013	W	19971230		
US 1998-101810	A3	19981119		
US 1998-101811	A3	19981119		
US 1998-125798	A3	19981202		
US 1998-125799	A3	19981202		
US 1998-125797	A1	19981203		
US 2000-638793	A1	20000809		
US 2001-858439	A1	20010516		

AB This invention describes ionic compds. where the anionic charge is delocalized. One compound of the invention contains an anionic part associated with at least one mono- or multivalent cationic part  $Mm+$ , in a number sufficient to ensure electronic neutrality of the material. M can be a hydronium, nitrosyl  $NO_+$ , an ammonium  $NH_4^+$ , a metallic cation with valence m, an organic cation having a valence m, or an organometallic cation having valence m. The anionic charge is carried by a new pentacyclic moiety or derivative of tetrapentalene carrying electroattractive substituents. The compds. are used notably for ionic conduction, electronic conductors, dyes and colorants, and catalysts for diverse chemical reactions. They can also be used as **electrolytes** in fuel cells and batteries.

IC ICM H01M006-16  
ICS H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 27, 28, 29, 35, 76

ST pentacyclic tetrapentalene salt charge delocalized anion ionic conduction; alkali alk earth transition metal salt heterocyclic **electrolyte**  
**polymer**; electrochem cell fuel polyelectrolyte cond soly catalysis  
**fluoropolymer** polysiloxane

IT **Polymerization**  
(anionic; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT **Polymers, uses**  
RL: DEV (Device component use); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)  
(block, ethylene oxide, propylene oxide, allyl glycidyl ether; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT Optical absorption  
(by **polymer electrolytes**; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT Carbon black, uses  
RL: DEV (Device component use); PRP (Properties); USES (Uses)  
(composite electrodes with soft **polymer** or  $LiCoO_2$  and **polymer** gel **electrolytes**, or with acetylene black,  $VO_2$  and PEO; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT Polyoxyalkylenes, processes  
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP

(Physical process); PROC (Process)  
(**electrolyte** complexes with lithium salts, carbon blacks,  
(1,2,3-triazolium) ionic liqs., and other materials; salts of  
pentacyclic or tetrapentalene derived anions, and their uses as ionic  
conductive materials)

IT Polysiloxanes, uses  
RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or  
engineered material use); PREP (Preparation); USES (Uses)  
(**fluorine**-containing, reaction products; salts of pentacyclic or  
tetrapentalene derived anions, and their uses as ionic conductive  
materials)

IT Polysiloxanes, uses  
RL: RCT (Reactant); TEM (Technical or engineered material use); RACT  
(Reactant or reagent); USES (Uses)  
(**fluorine**-containing; salts of pentacyclic or tetrapentalene  
derived anions, and their uses as ionic conductive materials)

IT Textiles  
(laminated, polyelectrolyte composite **membrane**  
**perfluorinated** sulfonylpyrazole-containing **polymer**; salts  
of pentacyclic or tetrapentalene derived anions, and their uses as  
ionic conductive materials)

IT Open circuit potential  
(of dye-sensitized solar cells with imidazolium-triazole-iodide  
**electrolytes**; salts of pentacyclic or tetrapentalene derived  
anions, and their uses as ionic conductive materials)

IT Ionic conductivity  
(of lithium salts in **polymer electrolytes** and  
**polymer** gel **electrolytes**; salts of pentacyclic or  
tetrapentalene derived anions, and their uses as ionic conductive  
materials)

IT Cyclic voltammetry  
(of secondary battery cells with **polymer** gel  
**electrolytes**; salts of pentacyclic or tetrapentalene derived  
anions, and their uses as ionic conductive materials)

IT **Fluorides**, uses  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic  
preparation); TEM (Technical or engineered material use); PREP  
(Preparation); USES (Uses)  
(organic; salts of pentacyclic or tetrapentalene derived anions, and their  
uses as ionic conductive materials)

IT Azines  
Group VA element compounds  
RL: NUU (Other use, unclassified); TEM (Technical or engineered material  
use); USES (Uses)  
(phosphazines, **polymers**, "solvents" for title compds.; salts  
of pentacyclic or tetrapentalene derived anions, and their uses as  
ionic conductive materials)

IT Polar solvents  
(**polymeric**; salts of pentacyclic or tetrapentalene derived  
anions, and their uses as ionic conductive materials)

IT Vinyl compounds, uses  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic  
preparation); TEM (Technical or engineered material use); PREP  
(Preparation); USES (Uses)  
(**polymers**; salts of pentacyclic or tetrapentalene derived  
anions, and their uses as ionic conductive materials)

IT **Fluoropolymers**, uses  
RL: RCT (Reactant); TEM (Technical or engineered material use); RACT  
(Reactant or reagent); USES (Uses)

- (polysiloxane-; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)
- IT Aldol condensation catalysts  
Antistatic agents  
Coloring materials  
Corrosion inhibitors  
Dyes  
Electron delocalization  
Esterification  
Friedel-Crafts reaction catalysts  
Fuel cell separators  
Heterojunction solar cells  
Ionic liquids  
Michael reaction catalysts  
**Plasticizers**  
Polyelectrolytes  
**Polymer electrolytes**  
**Polymerization catalysts**  
Solubility  
Substitution reaction, nucleophilic  
Surfactants  
(salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)
- IT **Fluoropolymers, uses**  
Polyanilines  
Salts, uses  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)
- IT **Fluoropolymers, uses**  
RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(siloxane-, reaction products; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)
- IT **661461-43-4P**  
RL: CAT (Catalyst use); PUR (Purification or recovery); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(Aldol condensation catalyst; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)
- IT **661467-43-2P**  
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(an antistatic surfactant; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)
- IT **210469-97-9P**  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(composite electrodes with LiCoO<sub>2</sub> and carbon black; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)
- IT 25322-68-3, Polyethylene oxide  
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); PROC (Process)  
(electrolyte complexes with lithium salts, carbon blacks, (1,2,3-triazolium) ionic liqs., and other materials; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)
- IT 210289-62-6P

RL: PRP (Properties); PUR (Purification or recovery); SPN (Synthetic preparation); PREP (Preparation)  
(**electrolyte**, ionic liquid; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT 210470-02-3P  
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(electropolymer.; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate  
RL: PRP (Properties)  
(in gel **polymer electrolyte**; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT 107-13-1, Acrylonitrile, reactions  
RL: PRP (Properties); RCT (Reactant); RACT (Reactant or reagent)  
(in gel **polymer electrolyte**; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT 661461-63-8P  
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(photoinitiator; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT 210289-59-1P  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(polyelectrolyte composite **membrane** with GoreTex and Friedel-Crafts catalyst; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT 661461-54-7P  
RL: PRP (Properties); PUR (Purification or recovery); SPN (Synthetic preparation); PREP (Preparation)  
(pure and **polymer electrolytes** with polyethylene oxide; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT 210289-36-4P 661461-40-1P 661461-42-3P 661461-49-0P  
661461-50-3P 661461-64-9P 661467-44-3P  
RL: DEV (Device component use); PRP (Properties); PUR (Purification or recovery); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT 554-68-7, Triethylammonium chloride 2624-17-1, Sodium isocyanurate 4128-37-4 7492-68-4, Copper carbonate 7727-37-9, Nitrogen, processes 14075-53-7, Potassium **tetrafluoroborate** 63872-66-2, 1,4-Diazabicyclo[2.2.2]octane, hydrochloride  
RL: FMU (Formation, unclassified); REM (Removal or disposal); FORM (Formation, nonpreparative); PROC (Process)  
(salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT 75-38-7D, Vinylidene **difluoride**, derivs., polymers of 80-62-6D, Methyl methacrylate, derivs., polymers of 88-12-0D, derivs., polymers of 107-13-1D, Acrylonitrile, derivs., polymers of  
RL: NUU (Other use, unclassified); TEM (Technical or engineered material use); USES (Uses)  
(salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT 210289-57-9P  
RL: PEP (Physical, engineering or chemical process); PUR (Purification or

recovery); PYP (Physical process); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); PROC (Process); RACT (Reactant or reagent)  
(salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT **210469-91-3P** 661461-52-5P  
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

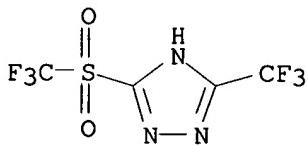
IT **210470-01-2P**  
RL: PUR (Purification or recovery); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
(salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT 709-62-6P 7343-34-2P, 3,5-Dimethyl-1H-1,2,4-triazole 25979-00-4P  
**210289-29-5P** 210289-38-6P 210289-49-9P 210289-52-4P  
210469-88-8P 210469-95-7P **661461-45-6P** 661461-57-0P  
661461-60-5P  
RL: PUR (Purification or recovery); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT 100-06-1P, p-Acetylanisole **210289-48-8P** **661461-44-5P**  
661461-53-6P **661461-55-8P** **661461-56-9P** 661467-37-4P  
RL: PUR (Purification or recovery); SPN (Synthetic preparation); PREP (Preparation)  
(salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

IT 76-05-1, reactions 78-94-4, Methyl vinyl ketone, reactions 94-41-7  
98-88-4, Benzoyl chloride 100-52-7, Benzaldehyde, reactions 100-66-3,  
Anisole, reactions 102-52-3, 1,1,3,3-Tetramethoxypropane 106-20-7,  
Di-2-ethylhexylamine 108-24-7, Acetic anhydride 109-72-8,  
Butyllithium, reactions 110-61-2, Succinic **dinitrile**  
112-76-5, Stearic acid chloride 121-44-8, Triethylamine, reactions  
143-33-9, Sodium cyanide 144-55-8, Sodium bicarbonate, reactions  
303-04-8, 2,3-Dichloro-**Hexafluoro**-2-butene 326-90-9, 4,4,4-  
**Trifluoro**-1-(2-furyl)-1,3-butanedione 326-91-0 **375-72-4**  
, **Perfluorobutanesulfonyl fluoride** 407-38-5, 2,2,2-  
**Trifluoroethyl trifluoroacetate** **421-83-0**,  
**Trifluoromethanesulfonyl** chloride 497-19-8, Sodium carbonate,  
reactions 538-75-0, Dicyclohexylcarbodiimide 542-92-7,  
Cyclopentadiene, reactions 554-13-2, Lithium carbonate 584-08-7,  
Potassium carbonate 676-58-4, Methylmagnesium chloride **677-25-8**  
, Ethenesulfonyl **fluoride** 692-50-2 693-13-0,  
1,3-Diisopropylcarbodiimide 764-93-2, 1-Decyne 765-12-8, Triethylene glycol divinyl ether 917-70-4, Lanthanum acetate 937-14-4,  
3-Chloroperoxybenzoic acid 1000-84-6 1068-57-1, Acetylhydrazide  
1122-28-7, 4,5-Dicyanoimidazole 1310-58-3, Potassium hydroxide,  
reactions 1522-22-1, **Hexafluoroacetylacetone** 1643-19-2,  
Tetrabutylammonium bromide **1648-99-3** 2094-98-6, 1,1'-Azobis(  
**cyclohexanecarbonitrile**) 2582-30-1, 1-Aminoguanidine bicarbonate  
2633-67-2, 4-Styrenesulfonyl chloride 2638-94-0, 4,4'-Azobis(4-  
cyanovaleric acid) 2893-78-9, Dichloroisocyanuric acid, sodium salt  
3804-23-7, Scandium acetate 4546-95-6, 1,2,3-Triazole-4,5-dicarboxylic  
acid 7447-41-8, Lithium chloride, reactions 7647-01-0, Hydrochloric  
acid, reactions 7647-14-5, Sodium chloride, reactions 7664-39-3,  
**Hydrofluoric** acid, reactions 7757-82-6, Sodium sulfate,  
reactions 7758-09-0, Potassium nitrite 7782-50-5, Chlorine, reactions  
7789-23-3, Potassium **fluoride** 9002-92-0, Brij 30 13360-57-1

13637-84-8, Chlorosulfonyl **fluoride** 13781-67-4,  
 2-(3-Thienyl)ethanol 14635-75-7, Nitrosonium **tetrafluoroborate**  
**16090-14-5** 17455-13-9, 18-Crown-6 17587-22-3, 1,1,1,2,2,3,3-  
**Heptafluoro-7,7-dimethyl-4,6-octanedione** 20583-66-8,  
**1,1,1,5,5,6,6,7,7,7-Decafluoro-2,4-Heptanedione** 26628-22-8,  
 Sodium azide 27070-49-1, 1,2,3-Triazole 31469-15-5,  
 1-Methoxy-1-(trimethylsilyloxy)-2-methyl-1-propene 39262-22-1  
 39377-49-6, Copper cyanide 53188-07-1, Trolox 56512-49-3,  
 4-(Dimethylamino)azobenzene-4'-sulfonyl chloride 65039-09-0,  
 1-Ethyl-3-methyl-1H-imidazolium chloride 66051-48-7 77968-17-3  
 81850-46-6 81850-47-7 89183-45-9, Polyaniline hydrochloride  
 210049-00-6 210289-26-2 210289-55-7 210469-93-5 **661461-58-1**  
 661461-61-6  
 RL: RCT (**Reactant**); RACT (Reactant or reagent)  
 (salts of pentacyclic or tetrapentalene derived anions, and their uses  
 as ionic conductive materials)  
 IT 7081-78-9P, 1-Chloro-1-ethoxyethane 14694-34-9P 210289-23-9P  
 210289-24-0P 210289-27-3P 210289-28-4P 210289-33-1P 210289-34-2P  
 210289-35-3P **210469-96-8P** **210470-00-1P** 661461-47-8P  
 661461-59-2P 661467-33-0P  
 RL: RCT (**Reactant**); SPN (Synthetic preparation); PREP (Preparation); RACT  
 (Reactant or reagent)  
 (salts of pentacyclic or tetrapentalene derived anions, and their uses  
 as ionic conductive materials)  
 IT 58649-05-1P 107740-92-1P 159699-92-0P 210289-25-1P 210469-94-6P  
 661461-39-8P 661461-41-2P **661461-46-7P** 661461-48-9P  
 661465-23-2P 661467-34-1P 661467-35-2P 661467-36-3P 661467-38-5P  
 661467-39-6DP, tetraalkylammonium salts  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (salts of pentacyclic or tetrapentalene derived anions, and their uses  
 as ionic conductive materials)  
 IT 156118-35-3DP, 2-(5-cyano-1,3,4-triazole)-4,4-difluorobutyl-,  
 lithium salt  
 RL: PUR (Purification or recovery); SPN (Synthetic preparation); PREP  
 (Preparation)  
 (surfactant and antistatic; salts of pentacyclic or tetrapentalene  
 derived anions, and their uses as ionic conductive materials)  
 IT **661461-43-4P**  
 RL: CAT (Catalyst use); PUR (Purification or recovery); SPN (Synthetic  
 preparation); PREP (Preparation); USES (Uses)  
 (Aldol condensation catalyst; salts of pentacyclic or tetrapentalene  
 derived anions, and their uses as ionic conductive materials)  
 RN 661461-43-4 HCPLUS  
 CN 1H-1,2,4-Triazole, 3-(trifluoromethyl)-5-[(trifluoromethyl)sulfonyl]-,  
 scandium(3+) salt (9CI) (CA INDEX NAME)



●1/3 Sc(III)

IT **661467-43-2P**

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(an antistatic surfactant; salts of pentacyclic or tetrapentalene  
derived anions, and their uses as ionic conductive materials)

RN 661467-43-2 HCAPLUS

CN Phenothiazin-5-i um, 3,7-bis(dimethylamino)-, salt with  
4-[(4-ethenylphenyl)sulfonyl]-3,5-bis(trifluoromethyl)-1,3-cyclopentadiene-  
1,2-dicarbonitrile (1:1), polymer with 2-propenenitrile (9CI) (CA INDEX  
NAME)

CM 1

CRN 107-13-1  
CMF C3 H3 N

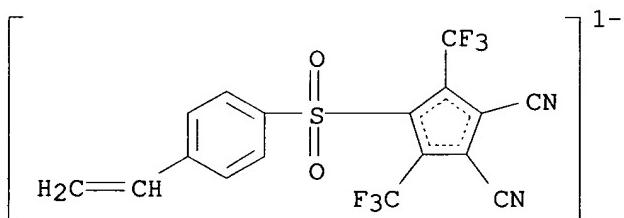


CM 2

CRN 661467-42-1  
CMF C17 H7 F6 N2 O2 S . C16 H18 N3 S

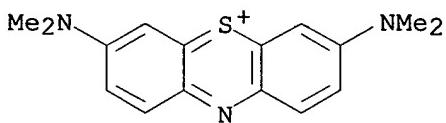
CM 3

CRN 661467-41-0  
CMF C17 H7 F6 N2 O2 S



CM 4

CRN 7060-82-4  
CMF C16 H18 N3 S



IT 210469-97-9P

RL: DEV (Device component use); PRP (Properties); SPN (Synthetic  
preparation); PREP (Preparation); USES (Uses)  
(composite electrodes with LiCoO2 and carbon black; salts of  
pentacyclic or tetrapentalene derived anions, and their uses as ionic

conductive materials)

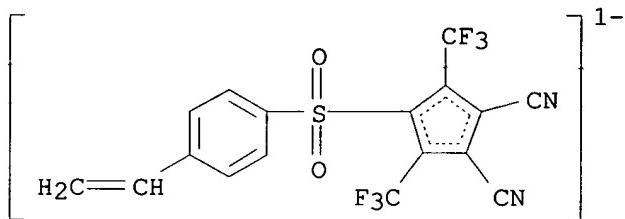
RN 210469-97-9 HCAPLUS

CN 1,3-Cyclopentadiene-1,2-dicarbonitrile, 4-[(4-ethenylphenyl)sulfonyl]-3,5-bis(trifluoromethyl)-, ion(1-), lithium, polymer with 2-propenenitrile (9CI) (CA INDEX NAME)

CM 1

CRN 210469-96-8

CMF C17 H7 F6 N2 O2 S . Li



CM 2

CRN 107-13-1

CMF C3 H3 N



IT 210470-02-3P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(electropolymer.; salts of pentacyclic or tetrapentalene derived anions,  
and their uses as ionic conductive materials)

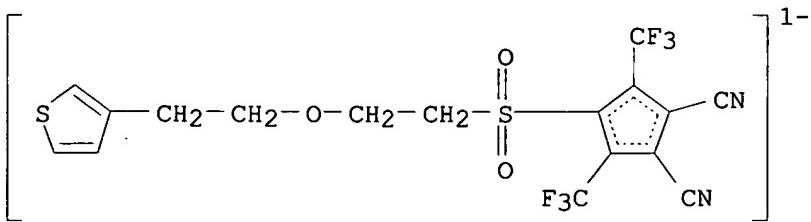
RN 210470-02-3 HCAPLUS

CN 1,3-Cyclopentadiene-1,2-dicarbonitrile, 4-[[2-[2-(3-thienyl)ethoxy]ethyl]sulfonyl]-3,5-bis(trifluoromethyl)-, ion(1-), potassium, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 210470-01-2

CMF C17 H11 F6 N2 O3 S2 . K



● K<sup>+</sup>

IT 661461-63-8P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(photoinitiator; salts of pentacyclic or tetrapentalene derived anions,  
and their uses as ionic conductive materials)

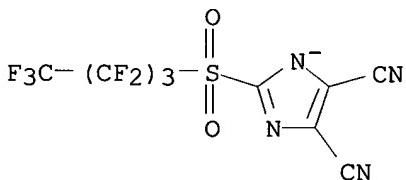
RN 661461-63-8 HCAPLUS

CN Iodonium, didodecyl-, salt with 2-[ (nonafluorobutyl)sulfonyl]-1H-imidazole-4,5-dicarbonitrile (1:1) (9CI) (CA INDEX NAME)

CM 1

CRN 661461-62-7

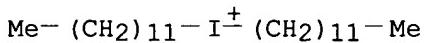
CMF C9 F9 N4 O2 S



CM 2

CRN 77355-27-2

CMF C24 H50 I



IT 210289-59-1P

RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(polyelectrolyte composite **membrane** with GoreTex and Friedel-Crafts catalyst; salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

RN 210289-59-1 HCAPLUS

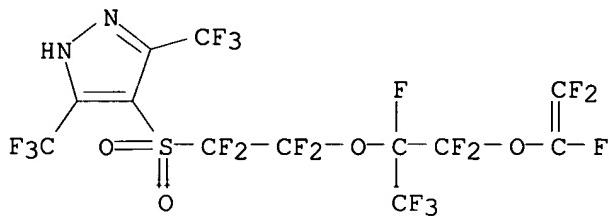
CN 1H-Pyrazole, 4-[2-[1-[difluoro[(trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoroethyl]sulfonyl]-3,5-

bis(trifluoromethyl)-, potassium salt, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 210289-57-9

CMF C12 H F19 N2 O4 S . K



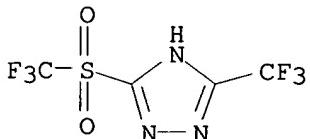
● K

IT 661461-42-3P

RL: DEV (Device component use); PRP (Properties); PUR (Purification or recovery); SPN (Synthetic preparation); PREP (Preparation); USES (Uses) (salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

RN 661461-42-3 HCPLUS

CN 1H-1,2,4-Triazole, 3-(trifluoromethyl)-5-[ (trifluoromethyl)sulfonyl]-, lithium salt (9CI) (CA INDEX NAME)



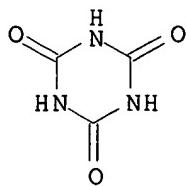
● Li

IT 2624-17-1, Sodium isocyanurate

RL: FMU (Formation, unclassified); REM (Removal or disposal); FORM (Formation, nonpreparative); PROC (Process) (salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

RN 2624-17-1 HCPLUS

CN 1,3,5-Triazine-2,4,6(1H,3H,5H)-trione, monosodium salt (9CI) (CA INDEX NAME)



● Na

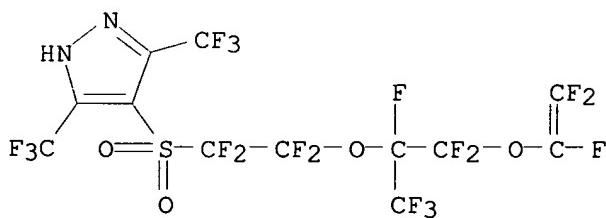
IT **210289-57-9P**

RL: PEP (Physical, engineering or chemical process); PUR (Purification or recovery); PYP (Physical process); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); PROC (Process); RACT (Reactant or reagent)

(salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

RN 210289-57-9 HCPLUS

CN 1H-Pyrazole, 4-[[2-[1-[difluoro[(trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoroethyl]sulfonyl]-3,5-bis(trifluoromethyl)-, potassium salt (9CI) (CA INDEX NAME)



● K

IT **210469-91-3P**

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

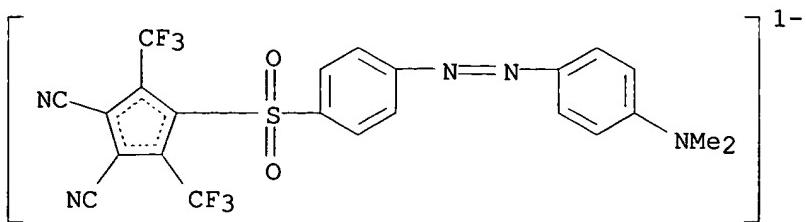
RN 210469-91-3 HCPLUS

CN 1-Butanaminium, N,N,N-tributyl-, salt with 4-[[4-[[4-(dimethylamino)phenyl]azo]phenyl]sulfonyl]-3,5-bis(trifluoromethyl)-1,3-cyclopentadiene-1,2-dicarbonitrile (1:1) (9CI) (CA INDEX NAME)

CM 1

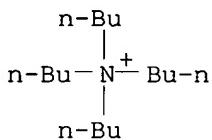
CRN 210469-90-2

CMF C23 H14 F6 N5 O2 S



CM 2

CRN 10549-76-5  
CMF C16 H36 N

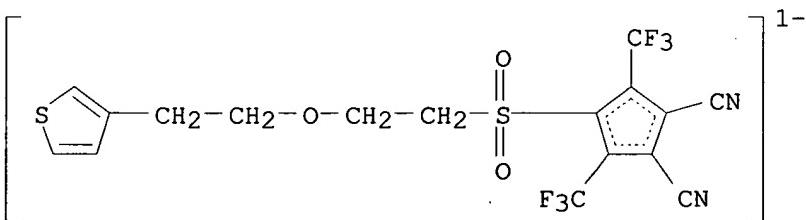


IT 210470-01-2P

RL: PUR (Purification or recovery); RCT (Reactant); PREP (Preparation);  
RACT (Reactant or reagent)  
(salts of pentacyclic or tetrapentalene derived anions, and their uses  
as ionic conductive materials)

RN 210470-01-2 HCAPLUS

CN 1,3-Cyclopentadiene-1,2-dicarbonitrile, 4-[[2-[2-(3-thienyl)ethoxy]ethyl]sulfonyl]-3,5-bis(trifluoromethyl)-, ion(1-),  
potassium (9CI) (CA INDEX NAME)



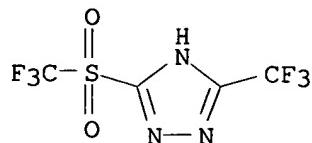
● K<sup>+</sup>

IT 210289-29-5P 661461-45-6P

RL: PUR (Purification or recovery); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(salts of pentacyclic or tetrapentalene derived anions, and their uses  
as ionic conductive materials)

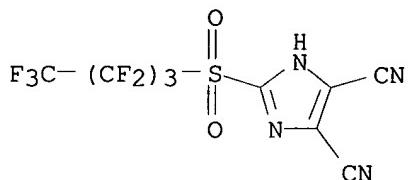
RN 210289-29-5 HCAPLUS

CN 1H-1,2,4-Triazole, 3-(trifluoromethyl)-5-[(trifluoromethyl)sulfonyl]-,  
potassium salt (9CI) (CA INDEX NAME)



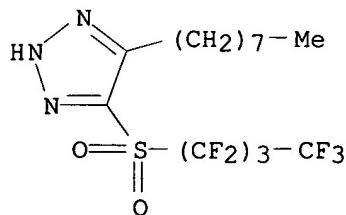
● K

RN 661461-45-6 HCPLUS  
CN 1H-Imidazole-4,5-dicarbonitrile, 2-[(nonafluorobutyl)sulfonyl]-, potassium salt (9CI) (CA INDEX NAME)



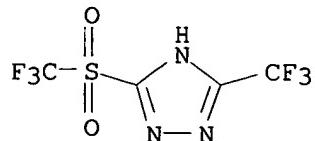
● K

IT 210289-48-8P 661461-44-5P 661461-55-8P  
**661461-56-9P**  
RL: PUR (Purification or recovery); SPN (Synthetic preparation); PREP (Preparation)  
(salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)  
RN 210289-48-8 HCPLUS  
CN 2H-1,2,3-Triazole, 4-[(nonafluorobutyl)sulfonyl]-5-octyl-, lithium salt (9CI) (CA INDEX NAME)



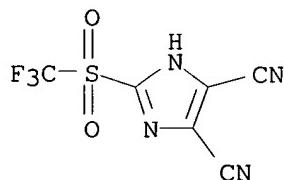
● Li

RN 661461-44-5 HCPLUS  
CN 1H-1,2,4-Triazole, 3-(trifluoromethyl)-5-[(trifluoromethyl)sulfonyl]-, lanthanum(3+) salt (9CI) (CA INDEX NAME)



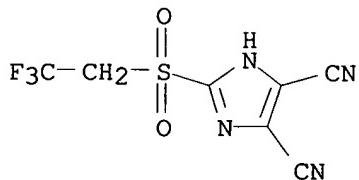
● 1/3 La(III)

RN 661461-55-8 HCAPLUS  
CN 1H-Imidazole-4,5-dicarbonitrile, 2-[(trifluoromethyl)sulfonyl]-, potassium salt (9CI) (CA INDEX NAME)



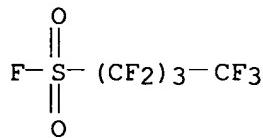
● K

RN 661461-56-9 HCAPLUS  
CN 1H-Imidazole-4,5-dicarbonitrile, 2-[(2,2,2-trifluoroethyl)sulfonyl]-, potassium salt (9CI) (CA INDEX NAME)

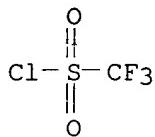


● K

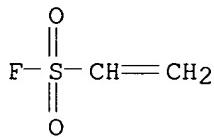
IT 375-72-4, Perfluorobutanesulfonyl fluoride  
421-83-0, Trifluoromethanesulfonyl chloride  
677-25-8, Ethenesulfonyl fluoride 1648-99-3  
16090-14-5 661461-58-1  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(salts of pentacyclic or tetrapentalene derived anions, and their uses  
as ionic conductive materials)  
RN 375-72-4 HCAPLUS  
CN 1-Butanesulfonyl fluoride, 1,1,2,2,3,3,4,4,4-nonafluoro- (8CI, 9CI) (CA INDEX NAME)



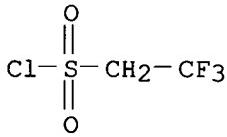
RN 421-83-0 HCPLUS  
CN Methanesulfonyl chloride, trifluoro- (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



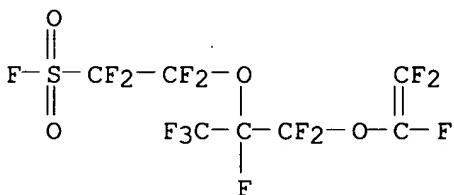
RN 677-25-8 HCAPLUS  
CN Ethenesulfonyl fluoride (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)



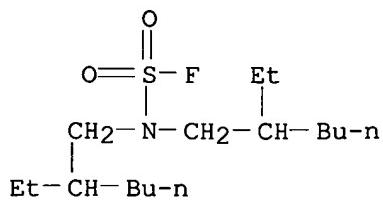
RN 1648-99-3 HCAPLUS  
CN Ethanesulfonyl chloride, 2,2,2-trifluoro- (7CI, 8CI, 9CI) (CA INDEX NAME)



RN 16090-14-5 HCPLUS  
CN Ethanesulfonyl fluoride, 2-[1-[difluoro[(trifluoroethyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro- (9CI) (CA INDEX NAME)



RN 661461-58-1 HCAPLUS  
CN 1-Hexanamine, 2-ethyl-N-(2-ethylhexyl)-N-(fluorosulfonyl)- (9CI) (CA INDEX NAME)



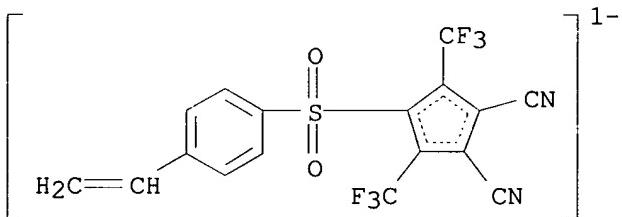
IT 210469-96-8P 210470-00-1P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(salts of pentacyclic or tetrapentalene derived anions, and their uses as ionic conductive materials)

RN 210469-96-8 HCPLUS

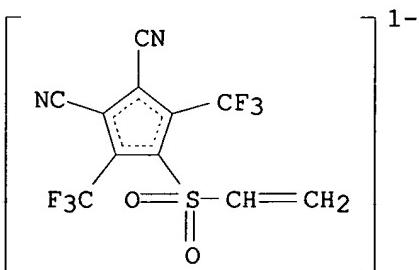
CN 1,3-Cyclopentadiene-1,2-dicarbonitrile, 4-[(4-ethenylphenyl)sulfonyl]-3,5-bis(trifluoromethyl)-, ion(1-), lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 210470-00-1 HCPLUS

CN 1,3-Cyclopentadiene-1,2-dicarbonitrile, 4-(ethenylsulfonyl)-3,5-bis(trifluoromethyl)-, ion(1-), potassium (9CI) (CA INDEX NAME)



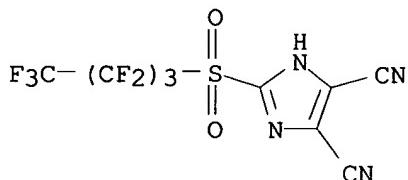
● K<sup>+</sup>

IT 661461-46-7P

RL: SPN (Synthetic preparation); PREP (Preparation)  
 (salts of pentacyclic or tetrapentalene derived anions, and their uses  
 as ionic conductive materials)

RN 661461-46-7 HCAPLUS

CN 1H-Imidazole-4,5-dicarbonitrile, 2-[(nonafluorobutyl)sulfonyl]-, lithium  
 salt (9CI) (CA INDEX NAME)



● Li

L51 ANSWER 6 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 2004:142660 HCAPLUS

DN 140:166814

TI A separator for **polymer electrolyte membrane**  
 fuel cell

IN Yoon, Jong-Jin; Lim, Il-Ji; Saitoh, Akihisa

PA S. Korea

SO U.S. Pat. Appl. Publ., 7 pp.  
 CODEN: USXXCO

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004033413	A1	20040219	US 2003-643647	20030818
	JP 2004079536	A2	20040311	JP 2003-293406	20030814
PRAI	KR 2002-48357	A	20020816		

AB The present invention provides a separator for a **polymer electrolyte membrane** fuel cell which comprises a resin substrate and an electroconductive coating formed on the substrate. The resin substrate is thermoplastic or thermosetting resin.

IC ICM H01M008-02

ICS H01M008-10; B32B027-34; B32B027-08; B32B027-36; B32B027-00

NCL 429034000; 429030000; 428412000; 428473500; 428474400

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

ST separator **polymer electrolyte membrane** fuel cell

IT Acrylic **polymers**, uses

Epoxy resins, uses

Phenols, uses

Polysiloxanes, uses

RL: MOA (Modifier or additive use); USES (Uses)  
 (binder; separator for **polymer electrolyte membrane** fuel cell)

IT Synthetic fibers

RL: MOA (Modifier or additive use); USES (Uses)

(boron; separator for **polymer electrolyte membrane** fuel cell)

IT Coating materials  
(elec. conductive; separator for **polymer electrolyte membrane** fuel cell)

IT Phenolic resins, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(novolak; separator for **polymer electrolyte membrane** fuel cell)

IT Metals, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(powder; separator for **polymer electrolyte membrane** fuel cell)

IT Cellulose pulp  
Electric conductivity  
Fuel cell separators  
Paper  
(separator for **polymer electrolyte membrane** fuel cell)

IT Polyamides, uses  
Polycarbonates, uses  
Polyimides, uses  
Polyoxymethylenes, uses  
Polysulfides  
RL: DEV (Device component use); USES (Uses)  
(separator for **polymer electrolyte membrane** fuel cell)

IT Asbestos  
RL: MOA (Modifier or additive use); USES (Uses)  
(separator for **polymer electrolyte membrane** fuel cell)

IT Carbon black, uses  
RL: MOA (Modifier or additive use); USES (Uses)  
(separator for **polymer electrolyte membrane** fuel cell)

IT Carbon fibers, uses  
RL: MOA (Modifier or additive use); USES (Uses)  
(separator for **polymer electrolyte membrane** fuel cell)

IT Clays, uses  
RL: MOA (Modifier or additive use); USES (Uses)  
(separator for **polymer electrolyte membrane** fuel cell)

IT Glass fibers, uses  
RL: MOA (Modifier or additive use); USES (Uses)  
(separator for **polymer electrolyte membrane** fuel cell)

IT Metallic fibers  
RL: MOA (Modifier or additive use); USES (Uses)  
(separator for **polymer electrolyte membrane** fuel cell)

IT Zeolites (synthetic), uses  
RL: MOA (Modifier or additive use); USES (Uses)  
(separator for **polymer electrolyte membrane** fuel cell)

IT Aminoplasts  
RL: TEM (Technical or engineered material use); USES (Uses)  
(separator for **polymer electrolyte membrane** fuel cell)

IT Fuel cells  
(solid **electrolyte**, direct methanol; separator for  
**polymer electrolyte membrane** fuel cell)

IT Coating process  
(spray; separator for **polymer electrolyte**  
**membrane** fuel cell)

IT Polythiophenylenes  
RL: TEM (Technical or engineered material use); USES (Uses)  
(substrate; separator for **polymer electrolyte**  
**membrane** fuel cell)

IT Synthetic **polymeric** fibers, uses  
RL: MOA (Modifier or additive use); USES (Uses)  
(**tetrafluoroethylene**; separator for **polymer**  
**electrolyte membrane** fuel cell)

IT Plastics, uses  
RL: DEV (Device component use); USES (Uses)  
(thermoplastics; separator for **polymer electrolyte**  
**membrane** fuel cell)

IT Plastics, uses  
RL: DEV (Device component use); USES (Uses)  
(thermosetting; separator for **polymer electrolyte**  
**membrane** fuel cell)

IT 7440-44-0, Carbon, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(elec. conductive; separator for **polymer electrolyte**  
**membrane** fuel cell)

IT 9003-56-9  
RL: DEV (Device component use); USES (Uses)  
(separator for **polymer electrolyte membrane**  
fuel cell)

IT 7631-86-9, Silica, uses  
RL: MOA (Modifier or additive use); USES (Uses)  
(separator for **polymer electrolyte membrane**  
fuel cell)

IT 67-56-1, Methanol, uses 9003-08-1, Melamine resin 25212-74-2,  
Ryon PR 26 56645-29-5, Tenac 654671-99-5, DS 0916AT 654672-10-3,  
Penolite KC 3020 654672-18-1, DS 7260THM 654672-30-7, CEL 400  
655233-24-2, DS 7250TH  
RL: TEM (Technical or engineered material use); USES (Uses)  
(separator for **polymer electrolyte membrane**  
fuel cell)

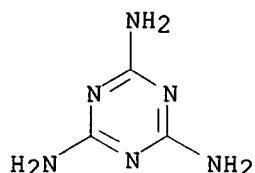
IT 9003-08-1, Melamine resin  
RL: TEM (Technical or engineered material use); USES (Uses)  
(separator for **polymer electrolyte membrane**  
fuel cell)

RN 9003-08-1 HCPLUS

CN 1,3,5-Triazine-2,4,6-triamine, polymer with formaldehyde (9CI) (CA INDEX  
NAME)

CM 1

CRN 108-78-1  
CMF C3 H6 N6



CM 2

CRN 50-00-0  
CMF C H<sub>2</sub> OH<sub>2</sub>C=O

L51 ANSWER 7 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 2004:21068 HCAPLUS  
 DN 140:79803  
 TI Fuel cell incorporating a **polymer electrolyte membrane** grafted by irradiation  
 IN Dubitsky, Yuri A.; Lopes Correia Tavares, Ana Berta; Zaopo, Antonio;  
 Albizzati, Enrico  
 PA Pirelli & C. S.P.A., Italy  
 SO PCT Int. Appl., 31 pp.  
 CODEN: PIXXD2  
 DT Patent  
 LA English  
 FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2004004053	A2	20040108	WO 2003-EP6580	20030623
	WO 2004004053	A3	20040325		
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	WO 2004051782	A1	20040617	WO 2002-EP7166	20020628
	W: US				
PRAI	WO 2002-EP7166	A	20020628		
AB	The invention concerns a fuel cell comprising: (a) an anode; (b) a cathode; (c) a <b>polymer electrolyte membrane</b> placed between the anode and the cathode which comprises at least one polyolefin grafted with side chains containing proton conductive functional groups; wherein the fuel cell has: a value of cell resistance at 90° not higher than 0.30 Ω-cm <sup>2</sup> , preferably comprised between 0.2 and 0.25 Ω-cm <sup>2</sup> , more preferably comprised between 0.05 and 0.20 Ω-cm <sup>2</sup> ; a value of cell resistance at 20° differing from the value of cell resistance at 90° of an amount not higher than 90%,				

preferably not higher than 70%, more preferably not higher than 50%, with respect to the value of cell resistance at 90°. Preferably, the fuel cell is a direct methanol fuel cell.

IC ICM H01M008-10  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38  
ST fuel cell **polymer electrolyte membrane**  
irradn grafted; methanol direct fuel cell  
IT Permeation  
(MeOH; fuel cell incorporating **polymer electrolyte membrane** grafted by irradiation)  
IT Sulfonation  
(agents; fuel cell incorporating **polymer electrolyte membrane** grafted by irradiation)  
IT Hydrocarbons, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(cyclic, solvent; fuel cell incorporating **polymer electrolyte membrane** grafted by irradiation)  
IT Polyoxyalkylenes, uses  
RL: DEV (Device component use); USES (Uses)  
(fluorine- and sulfo-containing, ionomers; fuel cell incorporating **polymer electrolyte membrane** grafted by irradiation)  
IT Decomposition catalysts  
Electric vehicles  
Fuel cell **electrolytes**  
(fuel cell incorporating **polymer electrolyte membrane** grafted by irradiation)  
IT Cyclic compounds  
RL: TEM (Technical or engineered material use); USES (Uses)  
(hydrocarbons, solvent; fuel cell incorporating **polymer electrolyte membrane** grafted by irradiation)  
IT Gamma ray  
Plasma  
UV radiation  
X-ray  
(irradiation; fuel cell incorporating **polymer electrolyte membrane** grafted by irradiation)  
IT **Fluoropolymers**, uses  
RL: DEV (Device component use); USES (Uses)  
(polyoxyalkylene-, sulfo-containing, ionomers; fuel cell incorporating **polymer electrolyte membrane** grafted by irradiation)  
IT Ionomers  
RL: DEV (Device component use); USES (Uses)  
(polyoxyalkylenes, fluorine- and sulfo-containing; fuel cell incorporating **polymer electrolyte membrane** grafted by irradiation)  
IT EPDM rubber  
**Fluoropolymers**, uses  
Polyolefins  
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)  
(proton-conductive functional group-containing side chain-grafted; fuel cell incorporating **polymer electrolyte membrane** grafted by irradiation)  
IT Fuel cells  
(solid **electrolyte**, **polymer electrolyte membrane**, direct methanol; fuel cell incorporating

**polymer electrolyte membrane grafted by  
irradiation)**

IT Alcohols, uses  
Aromatic hydrocarbons, uses  
Esters, uses  
Ethers, uses  
Ketones, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(solvent; fuel cell incorporating **polymer electrolyte  
membrane** grafted by irradiation)

IT Hydrocarbons, processes  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical  
process); PROC (Process)  
(unsatd.; fuel cell incorporating **polymer electrolyte  
membrane** grafted by irradiation)

IT Sulfonic acids, processes  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical  
process); PROC (Process)  
(vinylalkyl; fuel cell incorporating **polymer  
electrolyte membrane** grafted by irradiation)

IT 1344-67-8, Copper chloride 7720-78-7, Ferrous sulfate 10025-73-7,  
Chromic chloride 10045-89-3, Ferrous ammonium sulfate 10241-04-0,  
Cobaltic chloride  
RL: CAT (Catalyst use); USES (Uses)  
(fuel cell incorporating **polymer electrolyte  
membrane** grafted by irradiation)

IT 79-10-7, Acrylic acid, processes 79-41-4, Methacrylic acid, processes  
98-83-9,  $\alpha$ -Methylstyrene, processes 100-42-5, Styrene, processes  
100-42-5D, Styrene, chloroalkyl derivative 100-80-1, m-Methylstyrene  
**101-37-1**, Triallyl cyanurate 611-15-4, O-Methylstyrene  
622-97-9, p-Methylstyrene 696-31-1,  $\alpha$ - **Fluorostyrene**  
769-57-3,  $\alpha, \beta, \beta$ -Trimethylstyrene 1321-74-0,  
Divinylbenzene, processes 1337-81-1, Vinylpyridine 1592-20-7,  
p-Chloromethylstyrene 2082-61-3,  $\alpha, \beta$ -Dimethylstyrene  
7664-93-9, Sulfuric acid, processes 7789-21-1, **Fluorosulfonic**  
acid 7790-94-5, Chlorosulfonic acid 13537-32-1,  
**Fluorophosphoric** acid 13779-42-5, Chlorophosphoric acid  
90622-00-7, Benzene, ethenyl-, **trifluoro** derivative  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical  
process); PROC (Process)  
(fuel cell incorporating **polymer electrolyte  
membrane** grafted by irradiation)

IT 66796-30-3, Nafion 117 163294-14-2, Nafion 112  
RL: DEV (Device component use); USES (Uses)  
(fuel cell incorporating **polymer electrolyte  
membrane** grafted by irradiation)

IT 67-56-1, Methanol, uses 1333-74-0, Hydrogen, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(fuel cell incorporating **polymer electrolyte  
membrane** grafted by irradiation)

IT 12587-47-2, Beta particle  
RL: PEP (Physical, engineering or chemical process); PYP (Physical  
process); PROC (Process)  
(irradiation; fuel cell incorporating **polymer electrolyte  
membrane** grafted by irradiation)

IT 9002-85-1, Polyvinylidene chloride 9002-86-2, Polyvinyl chloride  
9002-88-4, Polyethylene 9003-07-0, Polypropylene 9010-79-1,  
Ethylene-propylene copolymer 9011-17-0, **Hexafluoropropylene**  
-vinylidene **fluoride** copolymer 24937-78-8, Ethylene-vinyl



moldings, **polymers** or **polymer** blends bearing sulfinate groups, or their metal or ammonium salts, are subjected to S-alkylation. A 5% DMSO solution of polysulfone sulfinate Li salt was stirred (10 g) with 10.179 g 5% DMSO solution of (3-bromopropyl)trimethylammonium bromide, left for 48 h at 80°, cast on a glass plate, and the solvent was evaporated to give a film which was removed from the glass and treated with 10% NaOH at room temperature for 24 h and then with H<sub>2</sub>O at 60° for 24 h.

IC ICM C08J005-22  
ICS B01D071-68; H01M008-02; H01M008-10; C08G065-48; C08G075-23

CC 37-3 (**Plastics** Manufacture and Processing)

ST sulfinate **polymer** alkylation; polysulfone sulfinate alkylation; quaternary ammonium salt alkylation **polymer** sulfinate; film manuf **polymer** sulfinate alkylated; **membrane** manuf **polymer** sulfinate alkylated

IT Polysulfones, uses  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
(Radel R, sulfinated, alkylated derivs.; production of oligomers and **polymers** containing sulfinate groups)

IT Electrolytic cells  
(**membrane**; production of oligomers and **polymers** containing sulfinate groups for electrolysis **membranes**)

IT Ionomers  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
(**membranes**; production of oligomers and **polymers** containing sulfinate groups)

IT Polyketones  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
(polyether-, sulfinated, alkylated derivs.; production of oligomers and **polymers** containing sulfinate groups)

IT Polyethers, uses  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
(polyketone-, sulfinated, alkylated derivs.; production of oligomers and **polymers** containing sulfinate groups)

IT Sulfinic acids  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
(**polymeric**, alkylated derivs.; production of oligomers and **polymers** containing sulfinate groups)

IT Anion exchange **membranes**  
Cation exchange **membranes**  
(production of oligomers and **polymers** containing sulfinate groups)

IT Quaternary ammonium compounds, uses  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
(reaction products with sulfinated **polymers**; production of oligomers and **polymers** containing sulfinate groups)

IT 17681-50-4D, C.I. 18105, reaction products with sulfinated **polymers**  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical

process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
(Cibacron Brilliant Red; production of oligomers and polymers containing sulfinate groups)

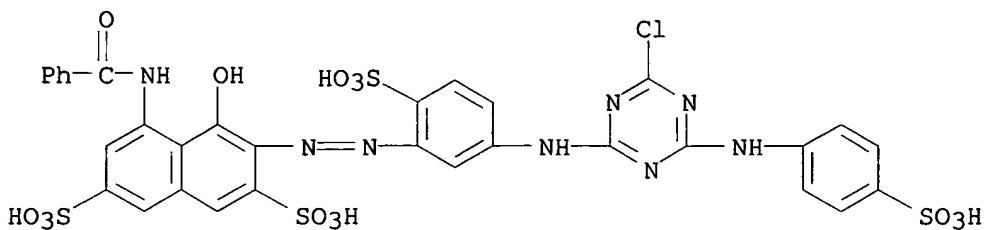
IT 50662-99-2D, C.I. 18972, reaction products with sulfinated polymers  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
(Cibacron Brilliant Yellow; production of oligomers and polymers containing sulfinate groups)

IT 312-30-1D, Bis(4-fluoro-3-nitrophenyl) sulfone, reaction products with sulfinated polymers 349-88-2D, 4-Fluorobenzenesulfonyl chloride, reaction products with sulfinated polymers 383-29-9D, Bis(4-fluorophenyl) sulfone, reaction products with sulfinated polymers 628-21-7D, 1,4-Diodobutane, reaction products with alkylated polymer sulfonates 832-53-1D, Pentafluorobenzenesulfonyl chloride, reaction products with sulfinated polymers 1622-32-8D, (2-Chloroethane)sulfonyl chloride, reaction products with sulfinated polymers 3607-17-8D, (3-Bromopropyl)triphenylphosphonium bromide, reaction products with sulfinated polymers 3779-42-8D, (3-Bromopropyl)trimethylammonium bromide, reaction products with sulfinated polymers 4263-52-9D, Sodium (2-bromoethyl)sulfonate, reaction products with sulfinated polymers 4857-04-9D, 2-(Chloromethyl)benzimidazole, reaction products with sulfinated polymers 5324-30-1D, Diethyl (2-bromoethyl)phosphonate, reaction products with sulfinated polymers 25135-51-7D, Udel, sulfinated, alkylated 54300-32-2D, Bis(4-fluorophenyl)phenylphosphine oxide, reaction products with sulfinated polymers 55120-75-7D, Calcium trifluoromethanesulfonate, reaction products with sulfinated polymers 60230-36-6D, 2,6-Difluorobenzenesulfonyl chloride, reaction products with sulfinated polymers 63051-08-1D, reaction products with sulfinated polymers 175278-08-7D, 2,3,4-Trifluorobenzenesulfonyl chloride, reaction products with sulfinated polymers 591249-21-7D, reaction products with sulfinated polymers 591249-22-8D, reaction products with sulfinated polymers  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
(production of oligomers and polymers containing sulfinate groups)

IT 17681-50-4D, C.I. 18105, reaction products with sulfinated polymers  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
(Cibacron Brilliant Red; production of oligomers and polymers containing sulfinate groups)

RN 17681-50-4 HCPLUS

CN 2,7-Naphthalenedisulfonic acid, 5-(benzoylamino)-3-[[5-[[4-chloro-6-[(4-sulfophenyl)amino]-1,3,5-triazin-2-yl]amino]-2-sulfophenyl]azo]-4-hydroxy-, tetrasodium salt (9CI) (CA INDEX NAME)



● 4 Na

IT 50662-99-2D, C.I. 18972, reaction products with sulfinated polymers

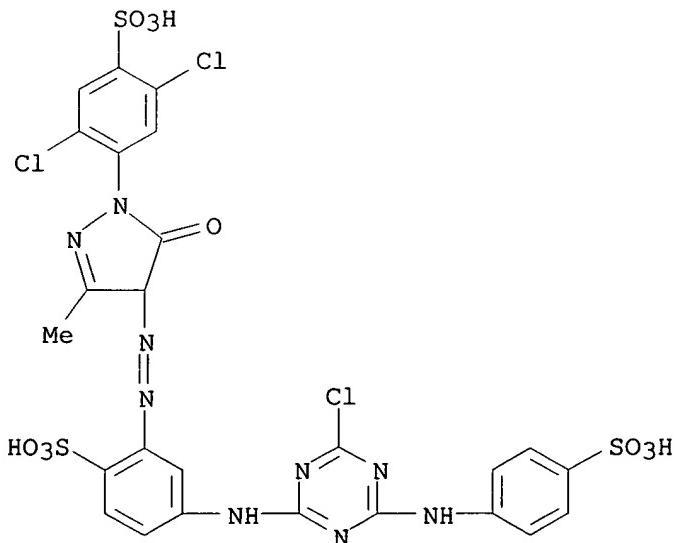
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)

(Cibacron Brilliant Yellow; production of oligomers and polymers containing sulfinate groups)

RN 50662-99-2 HCAPLUS

CN Benzenesulfonic acid, 4-[[4-chloro-6-[(4-sulfophenyl)amino]-1,3,5-triazin-2-yl]amino]-2-[[1-(2,5-dichloro-4-sulfophenyl)-4,5-dihydro-3-methyl-5-oxo-1H-pyrazol-4-yl]azo]-, trisodium salt (9CI) (CA INDEX NAME)

PAGE 1-A



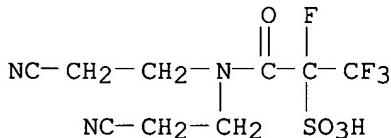
PAGE 2-A

● 3 Na

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

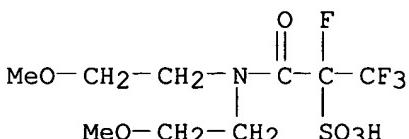
L51 ANSWER 9 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
AN 2003:475978 HCAPLUS  
DN 139:351042  
TI Lithium organic salts with extra functionalities  
AU Ollivrin, X.; Alloin, F.; Le Nest, J.-F.; Benrabah, D.; Sanchez, J.-Y.  
CS Laboratoire d'Electrochimie et de Physicochimie des Materiaux et des  
Interfaces (LEPMI), UMR 5631, CNRS-INPG-UJF, Saint-Martin-d'Heres, 38402,  
Fr.  
SO Electrochimica Acta (2003), 48(14-16), 1961-1969  
CODEN: ELCAAV; ISSN: 0013-4686  
PB Elsevier Science Ltd.  
DT Journal  
LA English  
AB Lithium perfluorosulfonate salts were incorporated to end-functionalized-  
PEO to enhance solvating and/or **plasticizing** effects or  
polarity. The compns. are a host **polymer** of **crosslinked**  
poly(ethylene oxide), the ionomer salts were prepared from piperazine  
end-capped poly(ethylene glycol) by isomerization of sultone and the mol.  
salts were obtained by reaction of secondary diamines with the linear  
isomer of hexafluoropropane sultone. The modifications resulted in  
improvements in ionic conductivity and cation transference number of ionomers  
and  
salts.  
CC 35-8 (Chemistry of Synthetic High **Polymers**)  
Section cross-reference(s): 37, 72, 76  
IT Transference number  
(cationic; preparation of lithium perfluorosulfonate - piperazine PEO  
ionomer **electrolytes** with improved ionic conductivity and  
transference number)  
IT Redox reaction  
(electrochem.; preparation of lithium perfluorosulfonate - piperazine PEO  
ionomer **electrolytes** with improved ionic conductivity and  
transference number)  
IT Crosslinking  
(photochem.; preparation of lithium perfluorosulfonate - piperazine PEO  
ionomer **electrolytes** with improved ionic conductivity and  
transference number)  
IT Ionic conductivity  
Isomerization  
**Polymer electrolytes**  
(preparation of lithium perfluorosulfonate - piperazine PEO ionomer  
**electrolytes** with improved ionic conductivity and transference number)  
IT 618891-63-7P  
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT  
(Reactant or reagent)  
(intermediate; preparation of lithium perfluorosulfonate - piperazine PEO  
ionomer **electrolytes** with improved ionic conductivity and  
transference number)  
IT 106797-53-9, Irgacure 2959  
RL: CAT (Catalyst use); USES (Uses)  
(photoinitiator; preparation of lithium perfluorosulfonate - piperazine PEO  
ionomer **electrolytes** with improved ionic conductivity and  
transference number)  
IT 618891-65-9P 618891-66-0P 618891-67-1P  
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(preparation and ionic conductivity and cation transference number of  
lithium  
perfluorosulfonate-diamine salts and complexes with linear PEO and

- mixts. with ionomer salts)
- IT 111-95-5, 2,2'-Dimethoxydiethylamine 142-84-7, N,N-Dipropylamine  
**754-41-6**, 2-(Fluorosulfonyl)tetrafluoropropionyl fluoride  
 1310-65-2, Lithium hydroxide 35855-66-4, 3-(2-Methoxyethylamino)  
**propionitrile**  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (preparation and ionic conductivity and cation transference number of lithium  
 perfluorosulfonate-diamine salts and complexes with linear PEO and  
 mixts. with ionomer salts)
- IT 618891-64-8P  
 RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
 (preparation of lithium perfluorosulfonate - piperazine PEO ionomer  
**electrolytes** with improved ionic conductivity and transference number)
- IT 110-85-0, Piperazine, reactions **773-15-9**, 3-(Trifluoromethyl)-  
 3,4,4-trifluoro-1-oxa-2-thiacyclobutane 2,2-dioxide 27252-69-3,  
 $\alpha,\omega$ -Dichloro-poly(ethylene glycol)  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (preparation of lithium perfluorosulfonate - piperazine PEO ionomer  
**electrolytes** with improved ionic conductivity and transference number)
- IT **618891-65-9P** **618891-66-0P** **618891-67-1P**  
 RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
 (preparation and ionic conductivity and cation transference number of lithium  
 perfluorosulfonate-diamine salts and complexes with linear PEO and  
 mixts. with ionomer salts)
- RN 618891-65-9 HCPLUS
- CN 2-Propanesulfonic acid, 3-[bis(2-cyanoethyl)amino]-1,1,1,2-tetrafluoro-3-oxo-, lithium salt (9CI) (CA INDEX NAME)



● Li

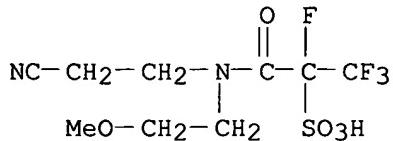
- RN 618891-66-0 HCPLUS
- CN 2-Propanesulfonic acid, 3-[bis(2-methoxyethyl)amino]-1,1,1,2-tetrafluoro-3-oxo-, lithium salt (9CI) (CA INDEX NAME)



● Li

- RN 618891-67-1 HCPLUS

CN 2-Propanesulfonic acid, 3-[(2-cyanoethyl)(2-methoxyethyl)amino]-1,1,1,2-tetrafluoro-3-oxo-, lithium salt (9CI) (CA INDEX NAME)

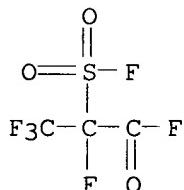


● Li

IT 754-41-6, 2-(Fluorosulfonyl)tetrafluoropropionyl fluoride  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (preparation and ionic conductivity and cation transference number of lithium perfluorosulfonate-diamine salts and complexes with linear PEO and mixts. with ionomer salts)

RN 754-41-6 HCPLUS

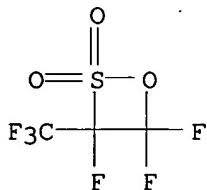
CN Propanoyl fluoride, 2,3,3,3-tetrafluoro-2-(fluorosulfonyl)- (9CI) (CA INDEX NAME)



IT 773-15-9, 3-(Trifluoromethyl)-3,4,4-trifluoro-1-oxa-2-thiacyclobutane 2,2-dioxide  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (preparation of lithium perfluorosulfonate - piperazine PEO ionomer electrolytes with improved ionic conductivity and transference number)

RN 773-15-9 HCPLUS

CN 1,2-Oxathietane, 3,4,4-trifluoro-3-(trifluoromethyl)-, 2,2-dioxide (8CI, 9CI) (CA INDEX NAME)

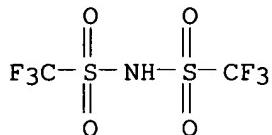


RE.CNT 16 THERE ARE 16 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L51 ANSWER 10 OF 37 HCPLUS COPYRIGHT 2005 ACS on STN  
 AN 2002:983140 HCPLUS

DN 138:274021  
TI Swollen Polymethacrylonitrile Urethane Networks for Lithium Batteries  
AU Belieres, J.-P.; Marechal, M.; Saunier, J.; Alloin, F.; Sanchez, J.-Y.  
CS Laboratoire d'Electrochimie et de Physicochimie des Materiaux et des Interfaces, UMR 5631, CNRS-INPG-UJF, Saint-Martin-d'Heres, Fr.  
SO Journal of the Electrochemical Society (2003), 150(1), A14-A20  
CODEN: JESOAN; ISSN: 0013-4651  
PB Electrochemical Society  
DT Journal  
LA English  
AB Copolymers of methacrylonitrile are reported. Surprisingly, their curing through urethane cross-links acts as an internal **plasticization**. This **crosslinking** prevents any dissoln. or leakage, up to 90°, when the networks are swollen by liquid organic **electrolytes**. These provide high conductivities, and the increase in resistivity with respect to pure liquid **electrolytes** remains ≤2. The electrochem. study shows a clear improvement of stability in reduction as compared to polyacrylonitrile. The 1st evaluations of lithium insertion in graphite are encouraging.  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
ST swollen polymethacrylonitrile urethane network lithium battery separator carbonate **electrolyte**  
IT Acrylic polymers, uses  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(polyurethane-; swollen polymethacrylonitrile urethane networks for lithium batteries)  
IT Polymerization  
(radical; swollen polymethacrylonitrile urethane networks for lithium batteries)  
IT Crosslinking  
Cyclic voltammetry  
Electric resistance  
Gels  
Ionic conductivity  
**Polymer electrolytes**  
**Polymer** networks  
Secondary battery separators  
(swollen polymethacrylonitrile urethane networks for lithium batteries)  
IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7,  
Propylene carbonate 616-38-6, Dimethyl carbonate  
RL: DEV (Device component use); USES (Uses)  
(carbonate **electrolyte** solns. with lithium salts, and polyacrylic-urethane gels swollen with; swollen polymethacrylonitrile urethane networks for lithium batteries)  
IT 21324-40-3, Lithium hexafluorophosphate (LiPF<sub>6</sub>) **90076-65-6**,  
Lithium bis(trifluoromethanesulfonyl)imide  
RL: DEV (Device component use); USES (Uses)  
(swollen polymethacrylonitrile urethane networks for lithium batteries)  
IT 33897-34-6P, Hydroxyethyl methacrylate-**Methacrylonitrile** copolymer 255875-15-1P 255875-23-1P  
RL: PRP (Properties); RCT (**Reactant**); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(swollen polymethacrylonitrile urethane networks for lithium batteries)  
IT 584-84-9, Tolylene-2,4-diisocyanate 822-06-0, Hexamethylene diisocyanate  
RL: RCT (**Reactant**); RACT (Reactant or reagent)  
(swollen polymethacrylonitrile urethane networks for lithium batteries)

IT 90076-65-6, Lithium bis(trifluoromethanesulfonyl)imide  
 RL: DEV (Device component use); USES (Uses)  
 (swollen polymethacrylonitrile urethane networks for lithium batteries)  
 RN 90076-65-6 HCAPLUS  
 CN Methanesulfonamide, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]-,  
 lithium salt (9CI) (CA INDEX NAME)

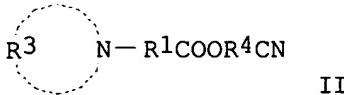
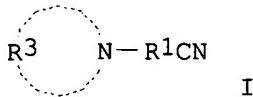


● Li

RE.CNT 36 THERE ARE 36 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L51 ANSWER 11 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 2002:638186 HCAPLUS  
 DN 137:192762  
 TI Amine compounds, resist compositions and patterning process  
 IN Hatakeyama, Jun; Kobayashi, Tomohiro; Watanabe, Takeru  
 PA Shin-Etsu Chemical Co., Ltd., Japan  
 SO U.S. Pat. Appl. Publ., 40 pp.  
 CODEN: USXXCO  
 DT Patent  
 LA English  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2002115018	A1	20020822	US 2001-3288	20011206
	US 6743564	B2	20040601		
	JP 2002249478	A2	20020906	JP 2001-369719	20011204
PRAI	JP 2000-373316	A	20001207		
OS	MARPAT 137:192762				
GI					



AB Amine compds. having a cyano group are useful in resist compns. for preventing a resist film from thinning and also for enhancing the resolution and focus margin of resist. The invention amine compds. have general formulas: (R<sub>2</sub>)<sub>b</sub>-N-(R<sub>1</sub>-CN)<sub>a</sub>; I; (R<sub>2</sub>)<sub>b</sub>-N-(R<sub>1</sub>C(=O)OR<sub>4</sub>-CN)<sub>a</sub>; II (R<sub>1,4</sub> = C<sub>1-4</sub>)

alkylene; R2 = C1-20 cycloc alkyl which may contain a hydroxy group, ether, carbonyl, ester, lactone ring, carbonate, cyano group; R3 = C2-20 alkylene which may contain hydroxy, ether, thioether, carbonyl, ester, thioester group, carbonate; a = 1-3; a+b = 3).

IC ICM G03F007-038  
ICS G03F007-039; G03F007-38

NCL 430270100

CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

Section cross-reference(s): 38

IT 3089-11-0  
RL: POF (Polymer in formulation); TEM (Technical or engineered material use); USES (Uses)  
(crosslinker; amine compds. and photoresist compns. for patterning process)

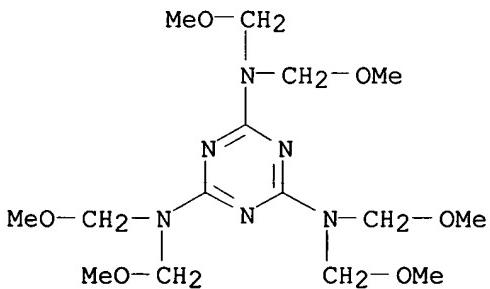
IT 117458-06-7 138529-81-4 144317-44-2 266308-64-9  
RL: TEM (Technical or engineered material use); USES (Uses)  
(photoacid generator; amine compds. and photoresist compns. for patterning process)

IT 64-18-6, Formic acid, reactions 75-04-7, Ethylamine, reactions 96-33-3, Methyl acrylate 106-71-8 107-13-1, **Acrylonitrile**, reactions 109-85-3, 2-Methoxyethylamine 109-89-7, Diethylamine, reactions 110-89-4, Piperidine, reactions 110-91-8, Morpholine, reactions 111-42-2, Diethanolamine, reactions 111-95-5 121-44-8, Triethylamine, reactions 123-75-1, Pyrrolidine, reactions 141-43-5, 2-Aminoethanol, reactions 156-87-6, 3-Hydroxy-1-propylamine 590-17-0, **Bromoacetonitrile** 929-06-6 4795-29-3, Tetrahydrofurfurylamine 5332-06-9, **4-Bromobutyronitrile** 13818-40-1, Cyanomethyl acrylate 22483-09-6, 2,2-Dimethoxyethylamine 74264-63-4 449165-37-1  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(preparation of amine compds. and photoresist compns. for patterning process)

IT 3089-11-0  
RL: POF (Polymer in formulation); TEM (Technical or engineered material use); USES (Uses)  
(crosslinker; amine compds. and photoresist compns. for patterning process)

RN 3089-11-0 HCPLUS

CN 1,3,5-Triazine-2,4,6-triamine, N,N,N',N',N'',N'''-hexakis(methoxymethyl)-(9CI) (CA INDEX NAME)



IT 144317-44-2  
RL: TEM (Technical or engineered material use); USES (Uses)  
(photoacid generator; amine compds. and photoresist compns. for patterning process)

RN 144317-44-2 HCPLUS

CN Sulfonium, triphenyl-, salt with 1,1,2,2,3,3,4,4,4-nonafluoro-1-butanesulfonic acid (1:1) (9CI) (CA INDEX NAME)

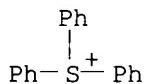
CM 1

CRN 45187-15-3  
CMF C4 F9 O3 S

-O<sub>3</sub>S-(CF<sub>2</sub>)<sub>3</sub>-CF<sub>3</sub>

CM 2

CRN 18393-55-0  
CMF C18 H15 S



L51 ANSWER 12 OF 37 HCPLUS COPYRIGHT 2005 ACS on STN  
 AN 2002:487624 HCPLUS  
 DN 137:64371  
 TI Crosslinkable fluorosulfonated nitrile elastomers based on vinylidene fluoride with low glass temperature and methods for preparing same  
 IN Ameduri, Bruno Michel; Manseri, Abdellatif; Boucher, Mario  
 PA Hydro-Quebec, Can.  
 SO PCT Int. Appl., 53 pp.  
 CODEN: PIXXD2  
 DT Patent  
 LA French  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002050142	A1	20020627	WO 2001-CA1439	20011012
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	CA 2328433	AA	20020620	CA 2000-2328433	20001220
	CA 2427481	AA	20020627	CA 2001-2427481	20011012
	AU 2002013687	A5	20020701	AU 2002-13687	20011012
	EP 1355962	A1	20031029	EP 2001-981986	20011012
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
	JP 2004526000	T2	20040826	JP 2002-552032	20011012
	US 2004097675	A1	20040520	US 2003-432957	20031106
PRAI	CA 2000-2328433	A	20001220		

WO 2001-CA1439 W 20011012  
OS MARPAT 137:64371  
AB The invention concerns monomers corresponding to formula: Z2C:CWX(CY2)<sub>n</sub>CN, wherein: X represents an oxygen atom or no atom; Z and Y represent a hydrogen or fluorine atom; W represents a hydrogen or fluorine atom or a CF<sub>3</sub> group; and n is a natural integer between 0 an 10 inclusively. Said monomers enable by means of novel copolymer methods to prepare **crosslinkable** fluorosulfonated nitrile elastomers having very low glass transition temperature (Tg). Thus, polymerization of CF<sub>2</sub>:CFC<sub>3</sub>H<sub>6</sub>CN 4.6, CF<sub>2</sub>:CFOCF<sub>2</sub>CF(CF<sub>3</sub>)OC<sub>2</sub>F<sub>4</sub>SO<sub>2</sub>F 28.4, and vinylidene fluoride 14 g in MeCN in the presence of tert-Bu peroxide, 15 h at 135° gave copolymer with Tg -31°.  
IC ICM C08F214-22  
CC 39-4 (Synthetic Elastomers and Natural Rubber)  
ST **crosslinkable** fluorosulfonated nitrile rubber vinylidene fluoride based manuf; fluorohexenenitrile perfluoromethylidioxaoctenesulfonyl fluoride vinylidene fluoride copolymer manuf  
IT Heat-resistant materials  
    (**crosslinkable** fluorosulfonated nitrile elastomers based on vinylidene fluoride with low glass temperature and good heat resistance)  
IT Fuel cells  
    (**crosslinkable** fluorosulfonated nitrile elastomers based on vinylidene fluoride with low glass temperature and good heat resistance for fuel cells)  
IT Ionomers  
RL: MSC (Miscellaneous)  
    (**crosslinkable** fluorosulfonated nitrile elastomers based on vinylidene fluoride with low glass temperature and good heat resistance for ionomers)  
IT Seals (parts)  
    (**crosslinkable** fluorosulfonated nitrile elastomers based on vinylidene fluoride with low glass temperature and good heat resistance for mech. seals)  
IT Membranes, nonbiological  
    (**crosslinkable** fluorosulfonated nitrile elastomers based on vinylidene fluoride with low glass temperature and good heat resistance for membranes)  
IT Polymer electrolytes  
    (**crosslinkable** fluorosulfonated nitrile elastomers based on vinylidene fluoride with low glass temperature and good heat resistance for polymer electrolytes)  
IT Pumps  
    (**crosslinkable** fluorosulfonated nitrile elastomers based on vinylidene fluoride with low glass temperature and good heat resistance for pumps)  
IT Pipes and Tubes  
    (**crosslinkable** fluorosulfonated nitrile elastomers based on vinylidene fluoride with low glass temperature and good heat resistance for tubs)  
IT Pistons  
    (heads; **crosslinkable** fluorosulfonated nitrile elastomers based on vinylidene fluoride with low glass temperature and good heat resistance for piston heads)  
IT Fluoro rubber  
RL: CPS (Chemical process); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)  
    (perfluoromethylidioxaoctenesulfonyl fluoride-trifluorohexenenitrile-vinylidene fluoride; **crosslinkable** fluorosulfonated nitrile elastomers based on vinylidene fluoride with low glass temperature and good

heat resistance)

IT **Polymerization**  
 (radical; of perfluoromethyldioxaoctenesulfonyl fluoride with trifluorohexenenitrile and vinylidene fluoride)

IT 354-61-0P, 1,2-Dichloro-1-iodotrifluoroethane 438627-62-4P,  
 5,6-Dichloro-3-iodo-5,6,6-trifluorohexenenitrile 438627-63-5P,  
 5,6-Dichloro-5,6,6-trifluorohexenenitrile  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (monomer precursor; **crosslinkable** fluorosulfonated nitrile elastomers based on vinylidene fluoride with low glass temperature and good heat resistance)

IT 79-38-9, Chlorotrifluoroethylene 109-75-1, Allyl cyanide  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (monomer precursor; **crosslinkable** fluorosulfonated nitrile elastomers based on vinylidene fluoride with low glass temperature and good heat resistance)

IT 203928-94-3P, 5,6,6-Trifluoro-5-hexenenitrile  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (monomer; **crosslinkable** fluorosulfonated nitrile elastomers based on vinylidene fluoride with low glass temperature and good heat resistance)

IT **438627-64-6P**  
 RL: CPS (Chemical process); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)  
 (rubber; **crosslinkable** fluorosulfonated nitrile elastomers based on vinylidene fluoride with low glass temperature and good heat resistance)

IT **438627-64-6P**  
 RL: CPS (Chemical process); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)  
 (rubber; **crosslinkable** fluorosulfonated nitrile elastomers based on vinylidene fluoride with low glass temperature and good heat resistance)

RN 438627-64-6 HCPLUS

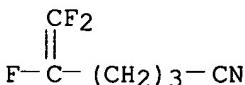
CN Ethanesulfonyl fluoride, 2-[1-[difluoro[(trifluoroethenyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro-, polymer with 1,1-difluoroethene and 5,6,6-trifluoro-5-hexenenitrile (9CI) (CA INDEX NAME)

CM 1

CRN 203928-94-3

CMF C6 H6 F3 N

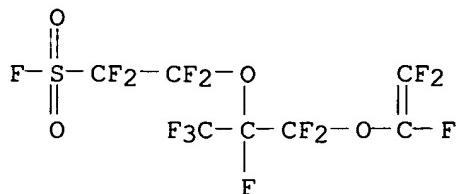
2



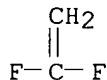
CM 2

CRN 16090-14-5

CMF C7 F14 O4 S



CM 3

CRN 75-38-7  
CMF C2 H2 F2RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMATL51 ANSWER 13 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
AN 2002:486454 HCAPLUS

DN 137:63924

TI **Polymer** structures for ion conductors with low resistance and high electrode efficiency and method for their manufacture

IN Arimura, Tomoaki

PA Nissan Motor Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 14 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2002184463	A2	20020628	JP 2000-376480	20001211
PRAI	JP 2000-376480		20001211		

AB The structures bear polar functional groups and ionically mutually-interactive functional groups which form a spiral shape on their intramol. interaction where the ion conductors are obtained by dispersing electrolyte compds. in the **polymer** structures. Thus, stirring 8.6 g 2-amino-2-phosphonitrilic chloride **trimer** -2-oxetaneacetic acid with 9.68 g 2-amino-2-triphenyl(2-pyridylmethyl)phosphonium chloride-2-oxetaneacetic acid, 130 mL THF and 5.1 g LiN(CF<sub>3</sub>SO<sub>2</sub>) at 2000 rpm while adding 3.10 g N-ethyl-N'-3-dimethylaminopropylcarbodiimide and 0.5 g Sn 2-ethylhexanoate, reacting at -20° for 4 h, heating up to 90°, after holding for 120 s, cooling to -30° at -10°/min, holding for 240 s and drying in vacuo gave an ion conductor which was dissolved in 120 mL AcNMe<sub>2</sub>, cast coated on a glass surface and dried to give a conductive film.

IC ICM H01M010-40

CC 37-3 (**Plastics** Manufacture and Processing)  
Section cross-reference(s): 52ST ion conductor **polymer** spiral structure manufIT Secondary batteries  
(lithium; **polymer** structures for ion conductors with low

resistance and high electrode efficiency and method for manufacture)

IT Conducting **polymers**  
Electric conductors  
**Polymer** electrolytes  
(**polymer** structures for ion conductors with low resistance and high electrode efficiency and method for manufacture)

IT **Polymer** morphology  
(spiral **polymer** structures for ion conductors with low resistance and high electrode efficiency and method for manufacture)

IT 1892-57-5, N-Ethyl-N'-3-dimethylaminopropylcarbodiimide  
RL: RGT (Reagent); RACT (Reactant or reagent)  
(dehydration condensation reagent; **polymer** structures for ion conductors with low resistance and high electrode efficiency and method for manufacture)

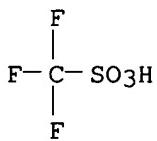
IT 940-71-6DP, **Phosphonitrilic** chloride **trimer**, reaction products with 2-aminooxetaneacetic acid, lithium complexes, trifluoromethanesulfonate-containing **polymers** 7439-93-2DP, Lithium, spiral **polymer** complexes, trifluoromethanesulfonate-containing 394653-46-4DP, reaction products with **phosphonitrilic** chloride **trimer**, lithium complexes, trifluoromethanesulfonate-containing **polymers**  
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(**polymer** structures for ion conductors with low resistance and high electrode efficiency and method for manufacture)

IT 301-10-0  
RL: MOA (Modifier or additive use); USES (Uses)  
(spiral structure-forming aids; **polymer** structures for ion conductors with low resistance and high electrode efficiency and method for manufacture)

IT 33454-82-9, Lithium triflate  
RL: TEM (Technical or engineered material use); USES (Uses)  
(support electrolyte; **polymer** structures for ion conductors with low resistance and high electrode efficiency and method for manufacture)

IT 33454-82-9, Lithium triflate  
RL: TEM (Technical or engineered material use); USES (Uses)  
(support electrolyte; **polymer** structures for ion conductors with low resistance and high electrode efficiency and method for manufacture)

RN 33454-82-9 HCPLUS  
CN Methanesulfonic acid, trifluoro-, lithium salt (8CI, 9CI) (CA INDEX NAME)



● Li

L51 ANSWER 14 OF 37 HCPLUS COPYRIGHT 2005 ACS on STN  
AN 2002:25856 HCPLUS  
DN 136:85613

TI Method for preparation of sulfonate and fluorine-containing nitrile compounds

IN Okada, Shinji; Watakabe, Atsushi

PA Asahi Glass Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 9 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2002003466	A2	20020109	JP 2000-189621	20000623
PRAI JP 2000-189621		20000623		

OS CASREACT 136:85613

AB Cyanoperfluoroalkanesulfonic acid derivs. represented by formula  $\text{HSO}_2\text{CF}_2[\text{CF}_2\text{OCF}(\text{CF}_3)]^n\text{CN}$  (I;  $n = 0, 1, 2, 3$ ) are prepared by hydrolysis of fluorosulfonyl fluoro nitriles represented by formula  $\text{FSO}_2\text{CF}_2[\text{CF}_2\text{OCF}(\text{CF}_3)]^n\text{CN}$  ( $n = \text{same as above}$ ) in the presence of tertiary amine followed by contacting the tertiary amine salt with acidic ion exchange resin. Unlike using alkali such as  $\text{K}_2\text{CO}_3$ , this process selectively hydrolyzes fluorosulfonyl group over cyano group. These compds. I are useful as intermediates for triazine-containing low mol. or **polymer electrolytes** as proton conductors of the **membrane** or catalyst bed in fuel cells. Thus, 346 g  $\text{FSO}_2\text{CF}_2\text{CF}_2\text{OCF}(\text{CF}_3)\text{COF}$  and 450 mL  $\text{Et}_2\text{O}$  were cooled at  $-70^\circ$ , treated dropwise with 17 g  $\text{NH}_3(l)$ , allowed to react at  $-70^\circ$  for 0.5 h, and warmed to room temperature over 2 h to give 303 g  $\text{FSO}_2\text{CF}_2\text{CF}_2\text{OCF}(\text{CF}_3)\text{CONH}_2$  (II). A solution of 286 g II in 1,200 g DMF was cooled at  $0^\circ$ , slowly treated dropwise with 221 g trifluoroacetic anhydride over 0.5 h and then 167 g pyridine over 1 h at  $2-4^\circ$ , and stirred for 0.5 h to give 201 g  $\text{FSO}_2\text{CF}_2\text{CF}_2\text{OCF}(\text{CF}_3)\text{CN}$  (III) in 70.3% yield. III (130 g) was slowly added dropwise to a mixed solution of 7.2 g  $\text{H}_2\text{O}$  and 226 g pyridine at  $0^\circ$  and stirred at room temperature for 3 h, followed by passing the reaction mixture through a column of Diaion SK 1BN ion exchange resin (Mitsubishi Chemical Corp., Japan) to give 109.2 g I ( $n = 1$ ) in 84% yield.

IC ICM C07C303-02

ICS C07C309-13; H01B001-06; H01B013-00; H01M008-02; H01M008-10;  
H01M010-40; C07D251-24

CC 23-19 (Aliphatic Compounds)

Section cross-reference(s): 76

ST cyanoperfluoroalkanesulfonic acid prepn intermediate fuel cell **electrolyte**; sulfonate fluorine contg nitrile prepn; fluorosulfonyl fluoro nitrile hydrolysis; tertiary amine hydrolysis catalyst

IT Fuel cell **electrolytes**

**Polymer electrolytes**

(preparation of sulfonate and fluorine-containing nitrile compds. as intermediates for triazine-containing low mol. or **polymer electrolytes** as proton conductors of the **membrane** or catalyst bed in fuel cells)

IT Amines, reactions

RL: RCT (**Reactant**); RACT (Reactant or reagent)  
(tertiary; preparation of sulfonate and fluorine-containing **nitrile** compds. by selective hydrolysis of fluorosulfonyl fluoro **nitrile** compound in presence of tertiary amine and treatment with cation exchange resin)

IT 382595-00-8P 382595-03-1P

RL: IMF (Industrial manufacture); RCT (**Reactant**); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(preparation of sulfonate and fluorine-containing **nitrile** compds. by selective hydrolysis of fluorosulfonyl fluoro **nitrile** compound in presence of tertiary amine and treatment with cation exchange resin)

IT 386273-59-2P 386273-60-5P 386273-61-6P

386273-62-7P

RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)

(preparation of sulfonate and fluorine-containing nitrile compds. by selective

hydrolysis of fluorosulfonyl fluoro nitrile compound in presence of tertiary amine and treatment with cation exchange resin)

IT 110-86-1, Pyridine, reactions 4089-57-0 82197-06-6, Diaion

SK-1BN 198140-97-5 382595-01-9 382595-02-0

RL: RCT (Reactant); RACT (Reactant or reagent)

(preparation of sulfonate and fluorine-containing **nitrile** compds. by selective hydrolysis of fluorosulfonyl fluoro **nitrile** compound in presence of tertiary amine and treatment with cation exchange resin)

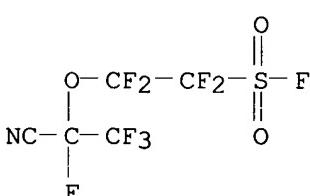
IT 382595-00-8P 382595-03-1P

RL: IMF (Industrial manufacture); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(preparation of sulfonate and fluorine-containing **nitrile** compds. by selective hydrolysis of fluorosulfonyl fluoro **nitrile** compound in presence of tertiary amine and treatment with cation exchange resin)

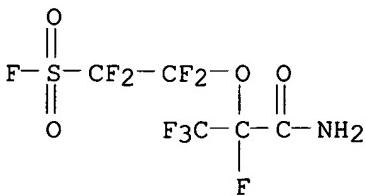
RN 382595-00-8 HCPLUS

CN Ethanesulfonyl fluoride, 2-(1-cyano-1,2,2,2-tetrafluoroethoxy)-1,1,2,2-tetrafluoro- (9CI) (CA INDEX NAME)



RN 382595-03-1 HCPLUS

CN Ethanesulfonyl fluoride, 2-[1-(aminocarbonyl)-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro- (9CI) (CA INDEX NAME)



IT 386273-59-2P 386273-60-5P 386273-61-6P

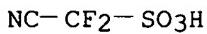
386273-62-7P

RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)

(preparation of sulfonate and fluorine-containing nitrile compds. by selective

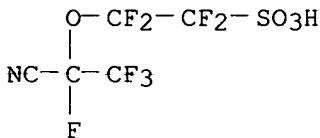
hydrolysis of fluorosulfonyl fluoro nitrile compound in presence of tertiary amine and treatment with cation exchange resin)

RN 386273-59-2 HCAPLUS  
 CN Methanesulfonic acid, cyanodifluoro- (9CI) (CA INDEX NAME)

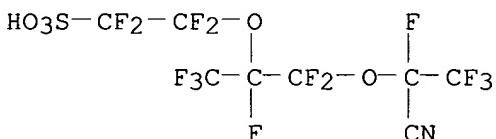


2

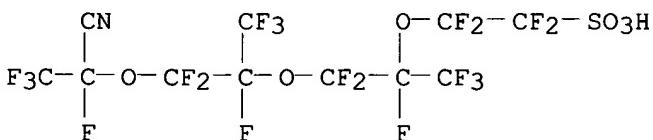
RN 386273-60-5 HCAPLUS  
 CN Ethanesulfonic acid, 2-(1-cyano-1,2,2,2-tetrafluoroethoxy)-1,1,2,2-tetrafluoro- (9CI) (CA INDEX NAME)



RN 386273-61-6 HCAPLUS  
 CN Ethanesulfonic acid, 2-[1-[(1-cyano-1,2,2,2-tetrafluoroethoxy)difluoromethyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro- (9CI) (CA INDEX NAME)



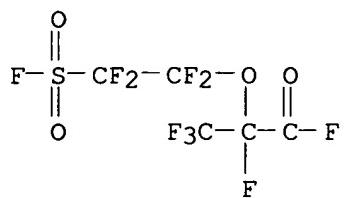
RN 386273-62-7 HCAPLUS  
 CN Ethanesulfonic acid, 2-[1-[[1-[(1-cyano-1,2,2,2-tetrafluoroethoxy)difluoromethyl]-1,2,2,2-tetrafluoroethoxy]difluoromethyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro- (9CI) (CA INDEX NAME)



IT 4089-57-0 198140-97-5 382595-01-9  
 382595-02-0

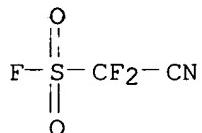
RL: RCT (Reactant); RACT (Reactant or reagent)  
 (preparation of sulfonate and fluorine-containing nitrile compds. by  
 selective hydrolysis of fluorosulfonyl fluoro nitrile compound  
 in presence of tertiary amine and treatment with cation exchange resin)

RN 4089-57-0 HCAPLUS  
 CN Propanoyl fluoride, 2,3,3,3-tetrafluoro-2-[1,1,2,2-tetrafluoro-2-(fluorosulfonyl)ethoxy]- (9CI) (CA INDEX NAME)



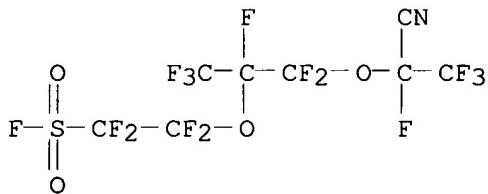
RN 198140-97-5 HCPLUS

CN Methanesulfonyl fluoride, cyanodifluoro- (9CI) (CA INDEX NAME)



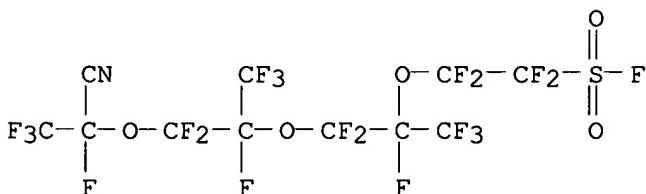
RN 382595-01-9 HCPLUS

CN Ethanesulfonyl fluoride, 2-[1-[(1-cyano-1,2,2,2-tetrafluoroethoxy)difluoromethyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro- (9CI) (CA INDEX NAME)



RN 382595-02-0 HCPLUS

CN Ethanesulfonyl fluoride, 2-[1-[(1-cyano-1,2,2,2-tetrafluoroethoxy)difluoromethyl]-1,2,2,2-tetrafluoroethoxy]difluoromethyl-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro- (9CI) (CA INDEX NAME)



L51 ANSWER 15 OF 37 HCPLUS COPYRIGHT 2005 ACS on STN

AN 2001:930203 HCPLUS

DN 136:53537

TI Preparation of high-boiling fluoronitriles as materials for crosslinkable perfluorocarbon polymers for battery electrolytes

IN Okada, Shinji; Watakabe, Atsushi

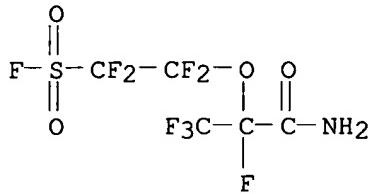
KATHLEEN FULLER EIC 1700 REMSEN 4B28 571/272-2505

PA Asahi Glass Co., Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 8 pp.  
 CODEN: JKXXAF

DT Patent  
 LA Japanese  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2001354641	A2	20011225	JP 2000-176613	20000613
PRAI	JP 2000-176613		20000613		
OS	CASREACT 136:53537				
AB	FSO <sub>2</sub> CF <sub>2</sub> CF <sub>2</sub> O[CF(CF <sub>3</sub> )CF <sub>2</sub> O] <sub>n</sub> CF(CF <sub>3</sub> )C.tplbond.N (n = 0-2) are prepared by amidation of FSO <sub>2</sub> CF <sub>2</sub> CF <sub>2</sub> O[CF(CF <sub>3</sub> )CF <sub>2</sub> O] <sub>n</sub> CF(CF <sub>3</sub> )COF with NH <sub>3</sub> , followed by dehydration. Thus, amidation of FSO <sub>2</sub> CF <sub>2</sub> CF <sub>2</sub> OCF(CF <sub>3</sub> )COF with liquid NH <sub>3</sub> at -70° in ether gave FSO <sub>2</sub> CF <sub>2</sub> CF <sub>2</sub> OCF(CF <sub>3</sub> )CONH <sub>2</sub> , which was treated with (CF <sub>3</sub> CO) <sub>2</sub> O in the presence of pyridine at 2-4° for 0.5 h in DMF to afford 70.3% FSO <sub>2</sub> CF <sub>2</sub> CF <sub>2</sub> OCF(CF <sub>3</sub> )C.tplbond.N with b.p. 89°.				
IC	ICM C07C303-22				
	ICS C07C309-87; H01B001-06; H01M008-02; H01M008-10				
CC	23-19 (Aliphatic Compounds)				
	Section cross-reference(s): 35, 52				
ST	fluoronitrile prepн material <b>crosslinkable</b> perfluorocarbon <b>polymer</b> ; battery <b>electrolyte</b> fluoronitrile prepн; fluorocarbonyl fluoride amidation dehydration				
IT	Polyethers, preparation				
	RL: PNU (Preparation, unclassified); PREP (Preparation) (perfluoro; preparation of high-boiling fluoronitriles as materials for <b>crosslinkable</b> perfluorocarbon <b>polymers</b> for battery <b>electrolytes</b> )				
IT	Fluoropolymers, preparation				
	RL: PNU (Preparation, unclassified); PREP (Preparation) (polyether-, perfluoro; preparation of high-boiling fluoronitriles as materials for <b>crosslinkable</b> perfluorocarbon <b>polymers</b> for battery <b>electrolytes</b> )				
IT	Battery <b>electrolytes</b>				
	(preparation of high-boiling fluoronitriles as materials for <b>crosslinkable</b> perfluorocarbon <b>polymers</b> for battery <b>electrolytes</b> )				
IT	<b>382595-03-1P</b>				
	RL: IMF (Industrial manufacture); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent) (preparation of)				
IT	<b>382595-00-8P 382595-01-9P 382595-02-0P</b>				
	RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation) (preparation of high-boiling fluoronitriles as materials for <b>crosslinkable</b> perfluorocarbon <b>polymers</b> for battery <b>electrolytes</b> )				
IT	<b>4089-57-0 4089-58-1 4628-44-8</b>				
	RL: RCT (Reactant); RACT (Reactant or reagent) (preparation of high-boiling <b>fluoronitriles</b> as materials for <b>crosslinkable</b> perfluorocarbon <b>polymers</b> for battery <b>electrolytes</b> )				
IT	<b>382595-03-1P</b>				
	RL: IMF (Industrial manufacture); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent) (preparation of)				
RN	382595-03-1 HCAPLUS				
CN	Ethanesulfonyl fluoride, 2-[1-(aminocarbonyl)-1,2,2,2-tetrafluoroethoxy]-				

1,1,2,2-tetrafluoro- (9CI) (CA INDEX NAME)

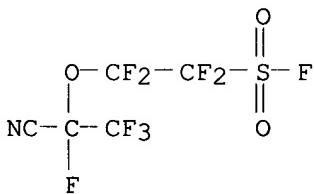


IT 382595-00-8P 382595-01-9P 382595-02-0P

RL: IMF (Industrial manufacture); SPN (Synthetic preparation); PREP (Preparation)  
 (preparation of high-boiling fluoronitriles as materials for crosslinkable perfluorocarbon polymers for battery electrolytes)

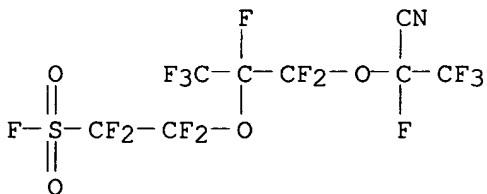
RN 382595-00-8 HCPLUS

CN Ethanesulfonyl fluoride, 2-(1-cyano-1,2,2,2-tetrafluoroethoxy)-1,1,2,2-tetrafluoro- (9CI) (CA INDEX NAME)



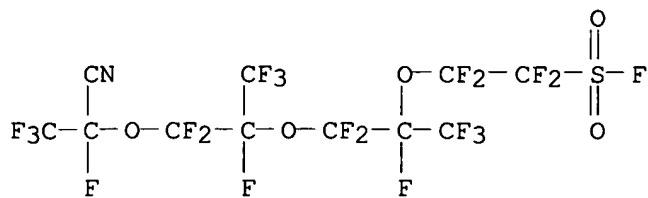
RN 382595-01-9 HCPLUS

CN Ethanesulfonyl fluoride, 2-[1-[(1-cyano-1,2,2,2-tetrafluoroethoxy)difluoromethyl]-1,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro- (9CI) (CA INDEX NAME)



RN 382595-02-0 HCPLUS

CN Ethanesulfonyl fluoride, 2-[1-[[1-[(1-cyano-1,2,2,2-tetrafluoroethoxy)difluoromethyl]-1,2,2-tetrafluoroethoxy]difluoromethyl]-1,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro- (9CI) (CA INDEX NAME)

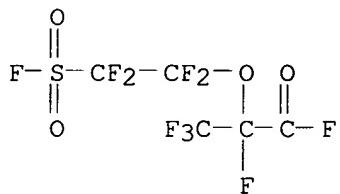


IT 4089-57-0 4089-58-1 4628-44-8

RL: RCT (Reactant); RACT (Reactant or reagent)  
 (preparation of high-boiling fluoronitriles as materials for  
 crosslinkable perfluorocarbon polymers for battery  
 electrolytes)

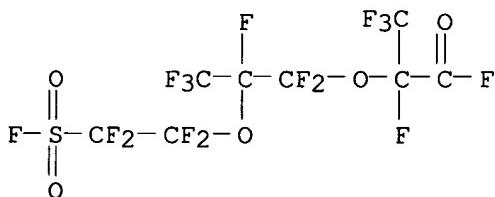
RN 4089-57-0 HCPLUS

CN Propanoyl fluoride, 2,3,3,3-tetrafluoro-2-[1,1,2,2-tetrafluoro-2-(fluorosulfonyl)ethoxy]- (9CI) (CA INDEX NAME)



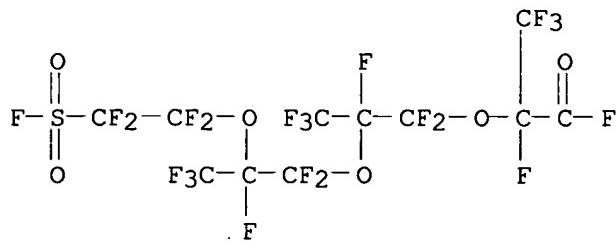
RN 4089-58-1 HCPLUS

CN Propanoyl fluoride, 2,3,3,3-tetrafluoro-2-[1,1,2,3,3-hexafluoro-2-[1,1,2,2-tetrafluoro-2-(fluorosulfonyl)ethoxy]propoxy]- (9CI) (CA INDEX NAME)



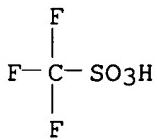
RN 4628-44-8 HCPLUS

CN Propanoyl fluoride, 2,3,3,3-tetrafluoro-2-[1,1,2,3,3-hexafluoro-2-[1,1,2,2-tetrafluoro-2-(fluorosulfonyl)ethoxy]propoxy]- (9CI) (CA INDEX NAME)



L51 ANSWER 16 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 2000:2015 HCAPLUS  
 DN 132:110489  
 TI Ionic conductivity and electrochemical characterization of novel microporous composite **polymer electrolytes**  
 AU Xu, Wu; Siow, Kok Siong; Gao, Zhiqiang; Lee, Swee Yong  
 CS Department of Chemistry, National University of Singapore, Singapore, 119260, Singapore  
 SO Journal of the Electrochemical Society (1999), 146(12), 4410-4418  
 CODEN: JESOAN; ISSN: 0013-4651  
 PB Electrochemical Society  
 DT Journal  
 LA English  
 AB Composite **polymer electrolytes** (CPEs) have been prepared by encapsulating **electrolyte** solns. of inorg. lithium salts dissolved in a **plasticizer** or mixture of **plasticizers** such as ethylene carbonate (EC), propylene carbonate (PC),  $\gamma$ -butyrolactone (BL) and di-Me carbonate (DMC), into porous **polymer membranes**. These **polymer membranes** are obtained from microemulsion **Polymerization** of the microemulsion system of acrylonitrile, 4-vinylbenzenesulfonic acid lithium salt, ethylene glycol dimethacrylate (as cross-linker),  $\omega$ -methoxy poly(ethyleneoxy)40 undecyl- $\alpha$ -methacrylate (as surfactant), and water. These CPEs exhibit conductivities of  $3.1 + 10^{-4}$  to  $1.2 + 10^{-3}$  S cm<sup>-1</sup> at room temperature. The lithium ion transference number, measured using a dc polarization method coupled with ac impedance spectroscopy, is found to be ca. 0.45. Cyclic voltammetry of the CPEs on stainless steel electrodes shows electrochem. stability windows extending up to 3.9, 4.0, and 4.4 V vs. Li<sup>+</sup>/Li for CPEs with 1M LiSO<sub>3</sub>CF<sub>3</sub>/EC-PC (1:1 by volume), 1M LiBF<sub>4</sub>/BL and 1M LiClO<sub>4</sub>/EC-DMC (1:1 by volume), resp. The impedance of the Li/CPE interface for the CPE with 1M LiClO<sub>4</sub>/EC-DMC under open circuit conditions is found to increase over storage time. Preliminary charge-discharge tests of prototype Li/CPE/LiMn<sub>2</sub>O<sub>4</sub> cells show an initial discharge capacity of ca. 118 mAh g<sup>-1</sup> of LiMn<sub>2</sub>O<sub>4</sub> at a discharge current rate of 0.10 mA cm<sup>-2</sup>, and promising cyclability.  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38, 76  
 ST battery **electrolyte** microporous composite **polymer**  
 IT Battery **electrolytes**  
 Electric impedance  
 Ionic conductivity  
**Polymer electrolytes**  
 Transference number  
 (ionic conductivity and electrochem. characterization of novel microporous composite **polymer electrolytes**)  
 IT Polyoxyalkylenes, preparation

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(ionic conductivity and electrochem. characterization of novel microporous composite **polymer electrolytes**)  
IT Fluoropolymers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(ionic conductivity and electrochem. characterization of novel microporous composite **polymer electrolytes**)  
IT Secondary batteries  
(lithium; ionic conductivity and electrochem. characterization of novel microporous composite **polymer electrolytes**)  
IT **Polymerization**  
(microemulsion; ionic conductivity and electrochem. characterization of novel microporous composite **polymer electrolytes**)  
IT Emulsions  
(microemulsions; ionic conductivity and electrochem. characterization of novel microporous composite **polymer electrolytes**)  
IT 96-48-0,  $\gamma$ -Butyrolactone 96-49-1, Ethylene carbonate 108-32-7,  
Propylene carbonate 616-38-6, Dimethyl carbonate 7439-93-2, Lithium,  
uses 12057-17-9, Lithium manganese oxide limn<sub>2</sub>o<sub>4</sub>  
RL: DEV (Device component use); USES (Uses)  
(ionic conductivity and electrochem. characterization of novel microporous composite **polymer electrolytes**)  
IT 7439-93-2D, Lithium, polyoxyalkylene-acrylate complexes, uses 7791-03-9,  
Lithium perchlorate 14283-07-9, Lithium tetrafluoroborate  
**33454-82-9**, Lithium trifluoromethanesulfonate 237770-04-6D,  
polyoxyalkylene-acrylate complexes  
RL: DEV (Device component use); PRP (Properties); USES (Uses)  
(ionic conductivity and electrochem. characterization of novel microporous composite **polymer electrolytes**)  
IT 107-13-1, Acrylonitrile, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(ionic conductivity and electrochem. characterization of novel microporous composite **polymer electrolytes**)  
IT 24937-79-9, Pvdf  
RL: TEM (Technical or engineered material use); USES (Uses)  
(ionic conductivity and electrochem. characterization of novel microporous composite **polymer electrolytes**)  
IT **33454-82-9**, Lithium trifluoromethanesulfonate  
RL: DEV (Device component use); PRP (Properties); USES (Uses)  
(ionic conductivity and electrochem. characterization of novel microporous composite **polymer electrolytes**)  
RN 33454-82-9 HCAPLUS  
CN Methanesulfonic acid, trifluoro-, lithium salt (8CI, 9CI) (CA INDEX NAME)



● Li

RE.CNT 28 THERE ARE 28 CITED REFERENCES AVAILABLE FOR THIS RECORD

KATHLEEN FULLER EIC 1700 REMSEN 4B28 571/272-2505

## ALL CITATIONS AVAILABLE IN THE RE FORMAT

L51 ANSWER 17 OF 37 HCPLUS COPYRIGHT 2005 ACS on STN  
 AN 1999:96208 HCPLUS  
 DN 130:168015  
 TI Ionic perfluorosulfonimide compounds with delocalized anionic charge, and their use as components of ionic conductors or catalysts  
 IN Armand, Michel; Michot, Christophe; Yagupolskii, Yurii; Yagupolskii, Lev; Bezdudny, Andrej; Kondratenko, Natalya  
 PA Acep Inc., Can.; Universite de Montreal; Centre National de la Recherche Scientifique; Institute of Organic Chemistry  
 SO PCT Int. Appl., 59 pp.  
 CODEN: PIXXD2  
 DT Patent  
 LA French  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9905100	A1	19990204	WO 1998-FR1663	19980727
	W: CA, JP, UA, US RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	CA 2266643	AA	19990204	CA 1998-2266643	19980727
	EP 928287	A1	19990714	EP 1998-941464	19980727
	EP 928287	B1	20031001		
	R: DE, FR, GB, IT				
	JP 2001507043	T2	20010529	JP 1999-509451	19980727
	EP 1388546	A2	20040211	EP 2003-292375	19980727
	EP 1388546	A3	20040303		
	R: DE, FR, GB, IT				
	US 6340716	B1	20020122	US 1999-269264	19990325
	US 2002013381	A1	20020131	US 2001-931076	20010817
	US 6548567	B2	20030415		
	US 2003195269	A1	20031016	US 2003-366450	20030214
	US 2004162362	A9	20040819		
	US 6841638	B2	20050111		
PRAI	CA 1997-2211465	A	19970725		
	EP 1998-941464	A3	19980727		
	WO 1998-FR1663	W	19980727		
	US 1999-269264	A3	19990325		
	US 2001-931076	A3	20010817		
OS	MARPAT 130:168015				
AB	The invention concerns ionic compds. of formula $[R_1X_1(:Z_1)Q-X_2(:Z_2)R_2]_m$ $Mm^+$ [I; in which $Mm^+$ is a cation of valence m; each $X_i = S:Z_3$ , $S:Z_4$ , $PR_3$ , or $PR_4$ ; Q = N, CR <sub>5</sub> , CCN, or CSO <sub>2</sub> R <sub>5</sub> ; each $Z_i = :O$ , :NC.tplbond.N, :C(C.tplbond.N)2, :NS(:Z)2R <sub>6</sub> , or :C[S(=Z)2R <sub>6</sub> ]2; each $R_i = Y$ , YO, YS, Y <sub>2</sub> N, or F; Y = monovalent organic radical, or repeat unit of a <b>polymeric</b> fabric]. I are useful for preparing materials with ionic conduction, <b>electrolytes</b> , as catalysts for <b>polymerization</b> and other organic reactions, and for doping <b>polymers</b> . For instance, butanesulfonyl chloride was condensed with CF <sub>3</sub> SO <sub>2</sub> NH <sub>2</sub> using DABCO, and the product treated with saturated KCl and AcOH to give crystalline BuSO <sub>2</sub> N(K)SO <sub>2</sub> CF <sub>3</sub> . This was treated with (COCl) <sub>2</sub> and DMF in MeCN, followed by treatment with CF <sub>3</sub> SO <sub>2</sub> NH <sub>2</sub> and DABCO, and then workup with aqueous KCl and AcOH, to give title compound CF <sub>3</sub> SO <sub>2</sub> N-S(:O)(Bu):NSO <sub>2</sub> CF <sub>3</sub> K <sup>+</sup> . The latter was converted to the corresponding Li <sup>+</sup> salt using LiBF <sub>4</sub> , and the Li salt was incorporated in poly(ethylene oxide) of mass 106 to give a film with conductivity >2 + 10 <sup>-5</sup> S/cm at 25°.				

IC ICM C07C381-10  
ICS C07C311-48; C07F007-18; C08K005-36; G02F001-15; H01M006-16  
CC 23-12 (Aliphatic Compounds)  
Section cross-reference(s): 35, 38, 67, 76  
ST perfluorosulfonimide ionic compd prep conductor catalyst; delocalized perfluorosulfonimide anion prep dopant conducting **polymer**  
IT **Polymerization** catalysts  
(cationic; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)  
IT **Crosslinking** catalysts  
(photochem.; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)  
IT **Polymerization** catalysts  
(photopolymn.; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)  
IT Addition reaction catalysts  
Aldol condensation catalysts  
Anions  
Condensation reaction catalysts  
Conducting **polymers**  
Diels-Alder reaction catalysts  
**Electrolytes**  
Electron delocalization  
Elimination reaction catalysts  
Friedel-Crafts reaction catalysts  
Isomerization catalysts  
Oxidation catalysts  
Polyelectrolytes  
**Polymerization** catalysts  
Primary batteries  
Reduction catalysts  
Secondary batteries  
Solvolytic catalysts  
(preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)  
IT Hydrocarbons, uses  
RL: NUU (Other use, unclassified); USES (Uses)  
(soluble **Polymerization** catalyst for; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)  
IT **Polymerization** catalysts  
(stereoselective; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)  
IT **220431-26-5P**  
RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation);  
USES (Uses)  
(Diels-Alder catalyst; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)  
IT **220431-45-8P**  
RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation);  
USES (Uses)  
(acidic isomerization catalyst; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)  
IT 75-56-9, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(catalyst for asym. **Polymerization** of; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)  
IT 107-25-5, Methyl vinyl ether  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(catalyst for isotactic **Polymerization** of; preparation of delocalized

- anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **210227-42-2P**, N-[(Trifluoromethyl)sulfonyl]-1-butanesulfonamide potassium salt  
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(chlorination and condensation with trifluoromethanesulfonamide; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **210227-20-6P**  
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(chlorination; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **220431-08-3P**  
RL: MOA (Modifier or additive use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(conductivity in poly(ethylene oxide); preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **220431-09-4P**  
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(conductivity in solution; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **220431-46-9P**  
RL: MOA (Modifier or additive use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(conductivity; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **109-77-3, Malononitrile**  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(condensation with benzenesulfonimidoyl fluoride derivative; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **30334-69-1**, Nonafluorobutanesulfonamide  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(condensation with bis(trifluoromethyl)trichlorophosphorane; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **156427-83-7**, N-(Trifluoromethylsulfonyl)phenylsulfonimidoyl fluoride **220431-05-0** **220431-28-7**  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(condensation with lithium nitride; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **220431-10-7P**, N-[(Trifluoromethyl)sulfonyl]-1-octanesulfonamide potassium salt **220431-30-1P**  
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(condensation with lithium nitride; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **220431-14-1P**  
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(condensation with malononitrile; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **220431-35-6P** **220431-36-7P** **220431-39-0P**  
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(copolymer.; preparation of delocalized anionic perfluorosulfonimide derivs.)

- as conductors and catalysts)
- IT **220431-13-0P**, 3,5-Bis(trifluoromethyl)-N-[trifluoromethyl]benzenesulfonamide potassium salt  
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(fluorination; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **220430-60-4P 220430-66-0P 220431-16-3P**  
**220431-17-4DP**, rare earth salts  
RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(multi-reaction catalyst; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **220431-44-7**  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(neutralization; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **220431-41-4P**  
RL: MOA (Modifier or additive use); POF (Polymer in formulation); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(polyelectrolyte; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT 74-85-1, Ethene, reactions 115-07-1, 1-Propene, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(polymerization catalyst for; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **220431-18-5P 220431-38-9P**  
RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(polymerization catalyst; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT 88-12-0, reactions 115-11-7, Isobutylene, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(polymerization catalysts for; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT 540-84-1P **220431-06-1P 220431-27-6P**  
**220431-29-8P 220431-31-2P 220431-34-5P**  
**220431-47-0P**  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **220431-12-9P**  
RL: MOA (Modifier or additive use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(properties; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT 765-12-8, 3,6,9,12-Tetraoxatetradeca-1,13-diene 130668-21-2,  
Cyclohexanenedimethanol divinyl ether  
RL: NUU (Other use, unclassified); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)  
(reactive solvent for polymerization catalyst; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **220431-11-8P**  
RL: MOA (Modifier or additive use); PRP (Properties); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent); USES (Uses)  
(salt conversion; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- IT **220431-07-2P 220431-15-2P 220431-23-2P**

**220431-25-4P 220431-32-3P**

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(salt conversion; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

IT 80-62-6 100-42-5, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)  
(soluble anionic catalyst for **polymerization** of; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

IT 108-88-3, Toluene, uses

RL: NUU (Other use, unclassified); USES (Uses)  
(soluble **polymerization** catalyst for; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

IT **220430-58-0P**

RL: CAT (Catalyst use); PRP (Properties); SPN (Synthetic preparation);  
PREP (Preparation); USES (Uses)  
(soluble **polymerization** catalyst; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

IT 68-12-2, Dimethylformamide, uses 75-05-8, Acetonitrile, uses 109-99-9,  
Tetrahydrofuran, uses 110-71-4, Glyme 141-78-6, Acetic acid ethyl ester, uses

RL: NUU (Other use, unclassified); USES (Uses)  
(solvent for **polymerization** catalyst; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

IT **220431-42-5P**

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(solubility; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

IT **421-85-2**, Trifluoromethanesulfonamide

RL: RCT (Reactant); RACT (Reactant or reagent)  
(sulfonamidation with butanesulfonyl chloride; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

IT 2386-60-9, Butanesulfonyl chloride 7795-95-1, Octanesulfonyl chloride  
13360-57-1, Dimethylsulfamoyl chloride **39234-86-1**,  
3,5-Bis(trifluoromethyl)benzenesulfonyl chloride

RL: RCT (Reactant); RACT (Reactant or reagent)  
(sulfonamidation with trifluoromethanesulfonamide; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

IT **220431-43-6P**

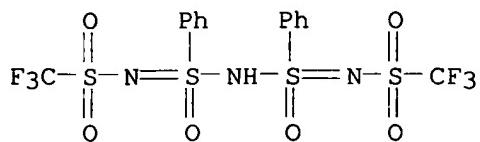
RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation);  
USES (Uses)  
(surface catalyst for silica; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

IT **220431-26-5P**

RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation);  
USES (Uses)  
(Diels-Alder catalyst; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

RN 220431-26-5 HCAPLUS

CN Methanesulfonamide, 1,1,1-trifluoro-N-[S-phenyl-N-[S-phenyl-N-  
[(trifluoromethyl)sulfonyl]sulfonimidoyl]sulfonimidoyl]-, lithium salt  
(9CI) (CA INDEX NAME)



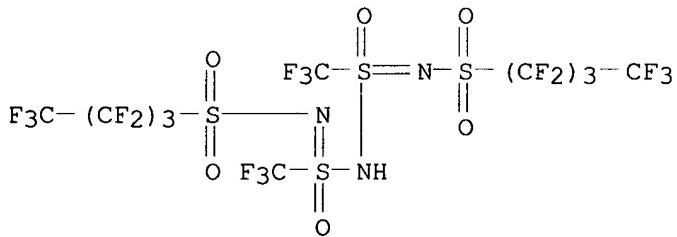
## ● Li

IT 220431-45-8P

RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation);  
 USES (Uses)  
 (acidic isomerization catalyst; preparation of delocalized anionic  
 perfluorosulfonimide derivs. as conductors and catalysts)

RN 220431-45-8 HCPLUS

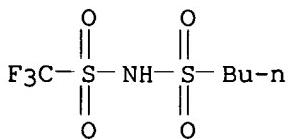
CN 1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro-N-[N-  
 [(nonafluorobutyl)sulfonyl]-S-(trifluoromethyl)sulfonimidoyl]-S-  
 (trifluoromethyl)sulfonimidoyl]- (9CI) (CA INDEX NAME)

IT 210227-42-2P, N-[(Trifluoromethyl)sulfonyl]-1-butanesulfonamide  
 potassium salt

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT  
 (Reactant or reagent)  
 (chlorination and condensation with trifluoromethanesulfonamide; preparation  
 of delocalized anionic perfluorosulfonimide derivs. as conductors and  
 catalysts)

RN 210227-42-2 HCPLUS

CN 1-Butanesulfonamide, N-[(trifluoromethyl)sulfonyl]-, potassium salt (9CI)  
 (CA INDEX NAME)



## ● K

IT 210227-20-6P

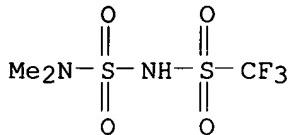
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT

(Reactant or reagent)

(chlorination; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

RN 210227-20-6 HCPLUS

CN Methanesulfonamide, N-[(dimethylamino)sulfonyl]-1,1,1-trifluoro-, potassium salt (9CI) (CA INDEX NAME)



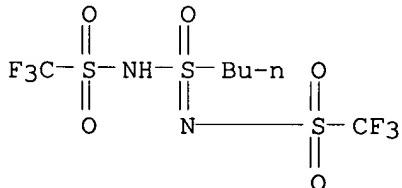
## ● K

IT 220431-08-3P

RL: MOA (Modifier or additive use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
 (conductivity in poly(ethylene oxide); preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

RN 220431-08-3 HCPLUS

CN Methanesulfonamide, N-[S-butyl-N-[(trifluoromethyl)sulfonyl]sulfonimidoyl]-1,1,1-trifluoro-, lithium salt (9CI) (CA INDEX NAME)



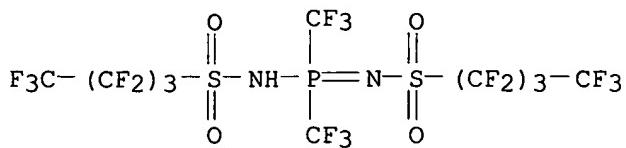
## ● Li

IT 220431-09-4P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
 (conductivity in solution; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

RN 220431-09-4 HCPLUS

CN 1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro-N-[[[nonafluorobutyl]sulfonyl]amino]bis(trifluoromethyl)phosphoranylidene)-, lithium salt (9CI) (CA INDEX NAME)



● Li

IT 220431-46-9P

RL: MOA (Modifier or additive use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
 (conductivity; preparation of delocalized anionic perfluorosulfonimide derivs. as  
 conductors and catalysts)

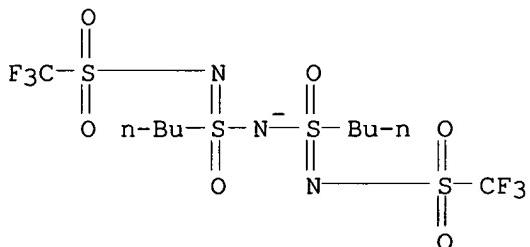
RN 220431-46-9 HCAPLUS

CN 1H-Imidazolium, 1-ethyl-3-methyl-, salt with N-[S-butyl-N-  
 [(trifluoromethyl)sulfonyl]sulfonimidoyl]-N'-(trifluoromethyl)sulfonyl]-1-  
 butanesulfonimidamide (1:1) (9CI) (CA INDEX NAME)

CM 1

CRN 220431-37-8

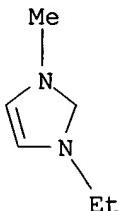
CMF C10 H18 F6 N3 O6 S4



CM 2

CRN 65039-03-4

CMF C6 H11 N2



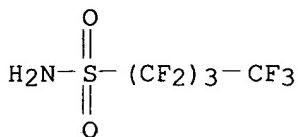
ONE OR MORE TAUTOMERIC DOUBLE BONDS NOT DISPLAYED IN THE STRUCTURE

KATHLEEN FULLER EIC 1700 REMSEN 4B28 571/272-2505

IT **30334-69-1**, Nonafluorobutanesulfonamide  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (condensation with bis(trifluoromethyl)trichlorophosphorane; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

RN 30334-69-1 HCPLUS

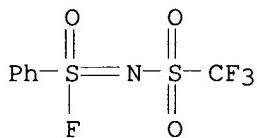
CN 1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro- (8CI, 9CI) (CA INDEX NAME)



IT **156427-83-7**, N-(Trifluoromethylsulfonyl)phenylsulfonimidoyl fluoride **220431-05-0** **220431-28-7**  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (condensation with lithium nitride; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

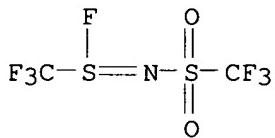
RN 156427-83-7 HCPLUS

CN Benzenesulfonimidoyl fluoride, N-[(trifluoromethyl)sulfonyl]- (9CI) (CA INDEX NAME)



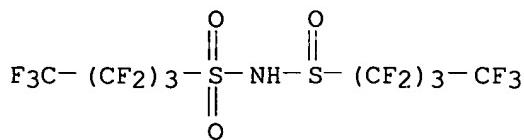
RN 220431-05-0 HCPLUS

CN Methanesulfinimidoyl fluoride, 1,1,1-trifluoro-N-[(trifluoromethyl)sulfonyl]- (9CI) (CA INDEX NAME)



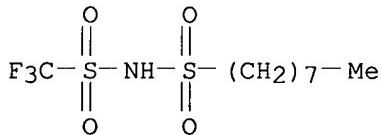
RN 220431-28-7 HCPLUS

CN 1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro-N-[(nonafluorobutyl)sulfinyl]-, sodium salt (9CI) (CA INDEX NAME)



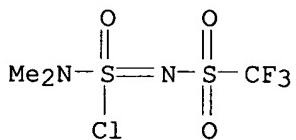
● Na

- IT 220431-10-7P, N-[(Trifluoromethyl)sulfonyl]-1-octanesulfonamide potassium salt 220431-30-1P  
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(condensation with lithium nitride; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- RN 220431-10-7 HCPLUS
- CN 1-Octanesulfonamide, N-[(trifluoromethyl)sulfonyl]-, potassium salt (9CI)  
(CA INDEX NAME)

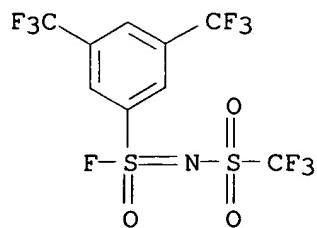


● K

- RN 220431-30-1 HCPLUS
- CN Imidosulfamoyl chloride, N,N-dimethyl-N'-(trifluoromethyl)sulfonyl- (9CI) (CA INDEX NAME)



- IT 220431-14-1P  
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(condensation with malononitrile; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- RN 220431-14-1 HCPLUS
- CN Benzenesulfonimidoyl fluoride, 3,5-bis(trifluoromethyl)-N-[(trifluoromethyl)sulfonyl]- (9CI) (CA INDEX NAME)



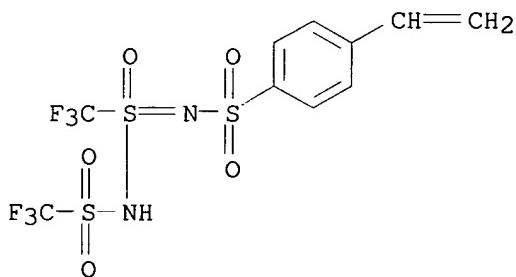
IT 220431-35-6P 220431-36-7P 220431-39-0P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(copolymn.; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

RN 220431-35-6 HCPLUS

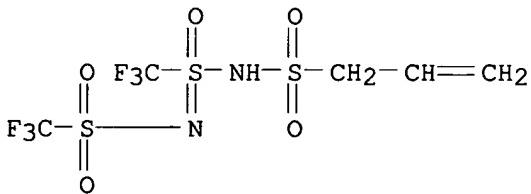
CN Benzenesulfonamide, 4-ethenyl-N-[S-(trifluoromethyl)-N-[(trifluoromethyl)sulfonyl]sulfonimidoyl]-, potassium salt (9CI) (CA INDEX NAME)



● K

RN 220431-36-7 HCPLUS

CN 2-Propene-1-sulfonamide, N-[S-(trifluoromethyl)-N-[(trifluoromethyl)sulfonyl]sulfonimidoyl]-, potassium salt (9CI) (CA INDEX NAME)

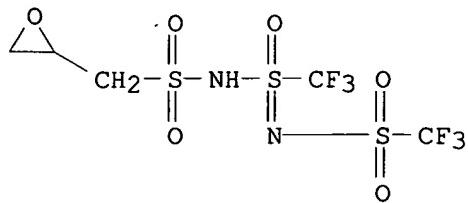


● K

RN 220431-39-0 HCPLUS

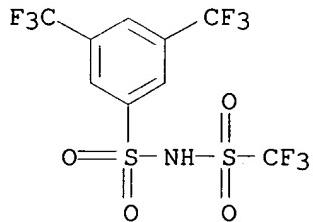
CN Oxiranemethanesulfonamide, N-[S-(trifluoromethyl)-N-

[ (trifluoromethyl)sulfonyl]sulfonimidoyl]-, potassium salt (9CI) (CA INDEX NAME)



● K

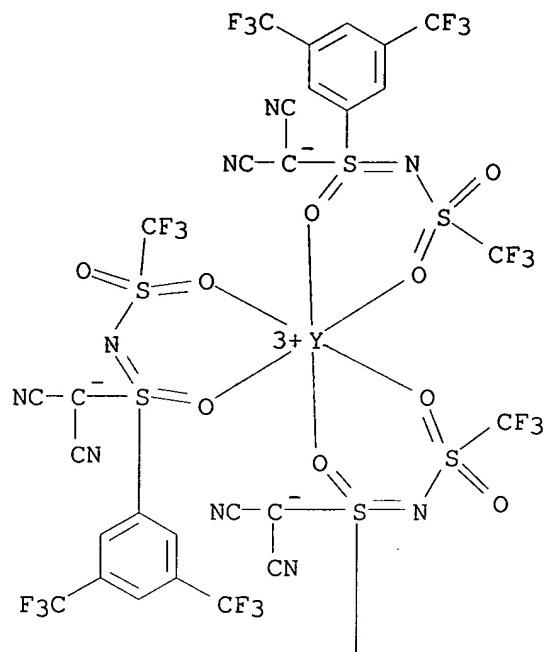
- IT 220431-13-0P, 3,5-Bis(trifluoromethyl)-N-[ (trifluoromethyl)sulfonyl]benzenesulfonamide potassium salt  
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
 (fluorination; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)
- RN 220431-13-0 HCPLUS
- CN Benzenesulfonamide, 3,5-bis(trifluoromethyl)-N-[ (trifluoromethyl)sulfonyl]-, potassium salt (9CI) (CA INDEX NAME)



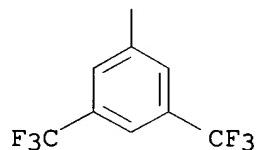
● K

- IT 220430-60-4P 220430-66-0P 220431-16-3P  
 220431-17-4DP, rare earth salts  
 RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation);  
 USES (Uses)  
 (multi-reaction catalyst; preparation of delocalized anionic  
 perfluorosulfonimide derivs. as conductors and catalysts)
- RN 220430-60-4 HCPLUS
- CN Yttrium, tris[[S-[3,5-bis(trifluoromethyl)phenyl]-N-[(trifluoromethyl)sulfonyl-κO]sulfonimidoyl-κO]propanedinitrilato]- (9CI) (CA INDEX NAME)

PAGE 1-A

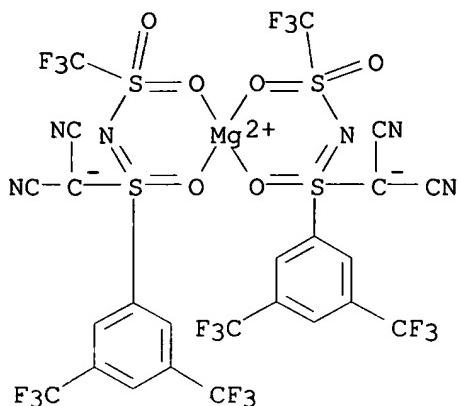


PAGE 2-A



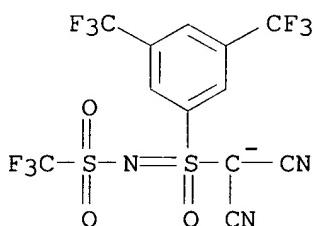
RN 220430-66-0 HCPLUS

CN Magnesium, bis[[S-[3,5-bis(trifluoromethyl)phenyl]-N-[(trifluoromethyl)sulfonyl- $\kappa$ O]sulfonimidoyl- $\kappa$ O]propanedinitrilato]-, (T-4)- (9CI) (CA INDEX NAME)



RN 220431-16-3 HCAPLUS

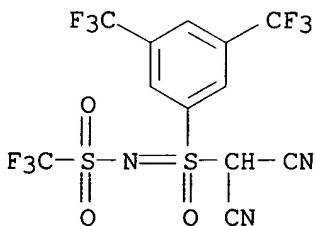
CN Propanedinitrile, [S-[3,5-bis(trifluoromethyl)phenyl]-N-[(trifluoromethyl)sulfonyl]sulfonimidoyl]-, ion(1-), lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 220431-17-4 HCAPLUS

CN Propanedinitrile, [S-[3,5-bis(trifluoromethyl)phenyl]-N-[(trifluoromethyl)sulfonyl]sulfonimidoyl]- (9CI) (CA INDEX NAME)



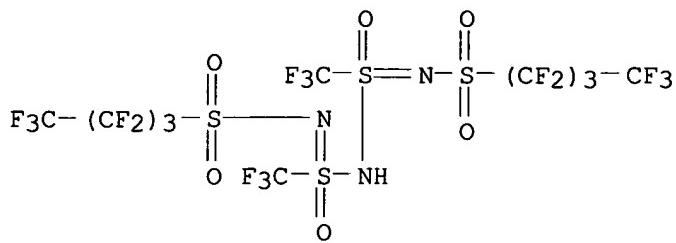
IT 220431-44-7

RL: RCT (Reactant); RACT (Reactant or reagent)  
(neutralization; preparation of delocalized anionic perfluorosulfonimide  
derivs. as conductors and catalysts)

RN 220431-44-7 HCAPLUS

CN 1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro-N-[N-  
[(nonafluorobutyl)sulfonyl]-S-(trifluoromethyl)sulfonimidoyl]-S-

(trifluoromethyl)sulfonimidoyl]-, potassium salt (9CI) (CA INDEX NAME)



## ● K

IT 220431-41-4P

RL: MOA (Modifier or additive use); POF (Polymer in formulation); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses) (polyelectrolyte; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

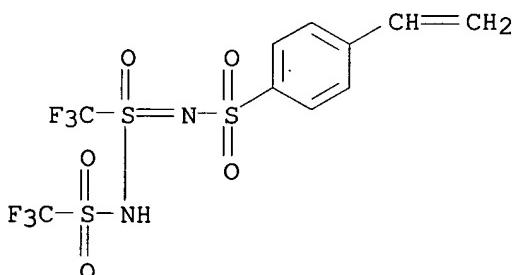
RN 220431-41-4 HCPLUS

CN Methanesulfonamide, N-[N-[(4-ethenylphenyl)sulfonyl]-S-(trifluoromethyl)sulfonimidoyl]-1,1,1-trifluoro-, monolithium salt, polymer with oxirane and [(2-propenyloxy)methyl]oxirane (9CI) (CA INDEX NAME)

CM 1

CRN 220431-40-3

CMF C10 H8 F6 N2 O5 S3 . Li

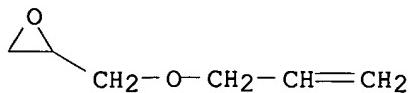


## ● Li

CM 2

CRN 106-92-3

CMF C6 H10 O2



CM 3

CRN 75-21-8  
CMF C2 H4 O

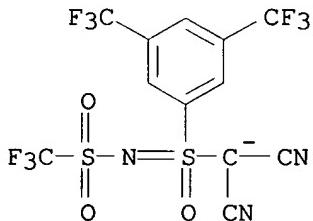


IT 220431-18-5P 220431-38-9P

RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation);  
USES (Uses)  
(polymerization catalyst; preparation of delocalized anionic  
perfluorosulfonimide derivs. as conductors and catalysts)

RN 220431-18-5 HCPLUS

CN Propanedinitrile, [S-[3,5-bis(trifluoromethyl)phenyl]-N-  
[(trifluoromethyl)sulfonyl]sulfonimidoyl]-, ion(1-), silver(1+) (9CI) (CA  
INDEX NAME)



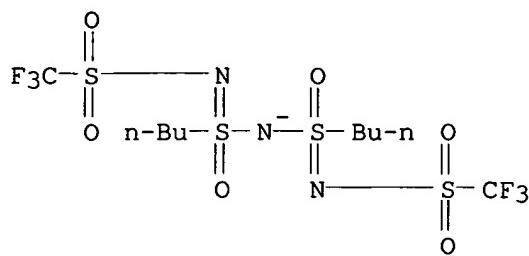
● Ag(I) +

RN 220431-38-9 HCPLUS

CN Iodonium, diphenyl-, salt with N-[S-butyl-N-[(trifluoromethyl)sulfonyl]sulfonyimidoyl]-N'-(trifluoromethyl)sulfonyl]-1-butanesulfonimidamide (1:1) (9CI) (CA INDEX NAME)

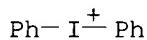
CM 1

CRN 220431-37-8  
CMF C10 H18 F6 N3 O6 S4

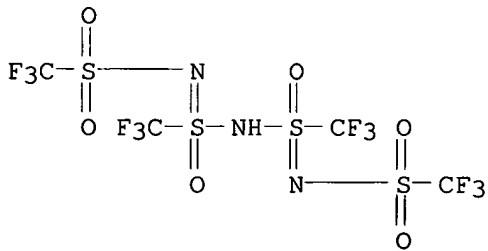


CM 2

CRN 10182-84-0  
CMF C12 H10 I

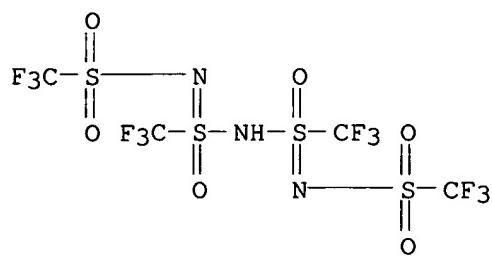


IT 220431-06-1P 220431-27-6P 220431-29-8P  
220431-31-2P 220431-34-5P 220431-47-0P  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(preparation of delocalized anionic perfluorosulfonimide derivs. as  
conductors and catalysts)  
RN 220431-06-1 HCPLUS  
CN Methanesulfonamide, 1,1,1-trifluoro-N-[S-(trifluoromethyl)-N-[S-  
(trifluoromethyl)-N-[(trifluoromethyl)sulfonimidoyl]sulfonimidoyl]  
]-, lithium salt (9CI) (CA INDEX NAME)



● Li

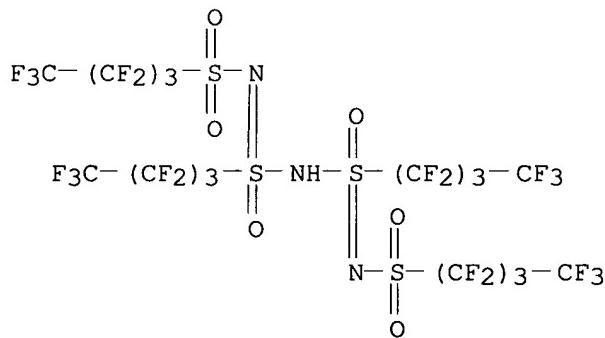
RN 220431-27-6 HCPLUS  
CN Methanesulfonamide, 1,1,1-trifluoro-N-[S-(trifluoromethyl)-N-[S-  
(trifluoromethyl)-N-[(trifluoromethyl)sulfonimidoyl]sulfonimidoyl]  
]-, potassium salt (9CI) (CA INDEX NAME)



● K

RN 220431-29-8 HCPLUS

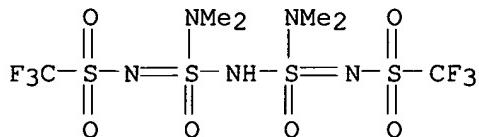
CN 1-Butanesulfonimidamide, 1,1,2,2,3,3,4,4,4-nonafluoro-N-[S-(nonafluorobutyl)-N-[(nonafluorobutyl)sulfonyl]sulfonimidoyl]-N'-(nonafluorobutyl)sulfonyl-, potassium salt (9CI) (CA INDEX NAME)



● K

RN 220431-31-2 HCPLUS

CN Methanesulfonamide, N-[S-(dimethylamino)-N-[S-(dimethylamino)-N-[(trifluoromethyl)sulfonyl]sulfonimidoyl]sulfonimidoyl]-1,1,1-trifluoro-, potassium salt (9CI) (CA INDEX NAME)

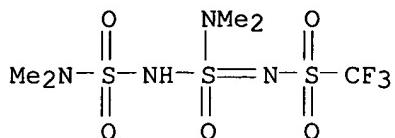


● K

RN 220431-34-5 HCPLUS

CN Methanesulfonamide, N-[S-(dimethylamino)-N-[(dimethylamino)sulfonyl]sulfon

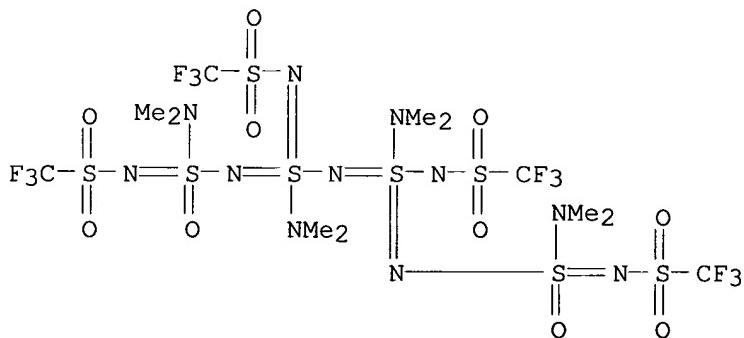
imidoyl]-1,1,1-trifluoro-, lithium salt (9CI) (CA INDEX NAME)



● Li

RN 220431-47-0 HCPLUS

CN Tetraiminoimidodisulfamide, N,N,N',N'-tetramethyl-N'',N''''-bis[S-(dimethylamino)-N-[(trifluoromethyl)sulfonyl]sulfonimidoyl]-N'',N'''''-bis[(trifluoromethyl)sulfonyl]-, potassium salt (9CI) (CA INDEX NAME)



● K

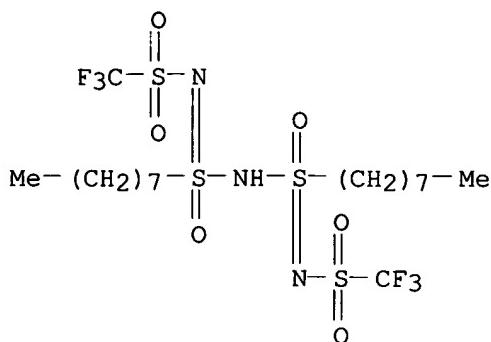
ONE OR MORE TAUTOMERIC DOUBLE BONDS NOT DISPLAYED IN THE STRUCTURE

IT 220431-12-9P

RL: MOA (Modifier or additive use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
 (properties; preparation of delocalized anionic perfluorosulfonimide derivs.  
 as conductors and catalysts)

RN 220431-12-9 HCPLUS

CN Methanesulfonamide, 1,1,1-trifluoro-N-[S-octyl-N-[S-octyl-N-[(trifluoromethyl)sulfonyl]sulfonimidoyl]sulfonimidoyl]-, lithium salt (9CI) (CA INDEX NAME)



● Li

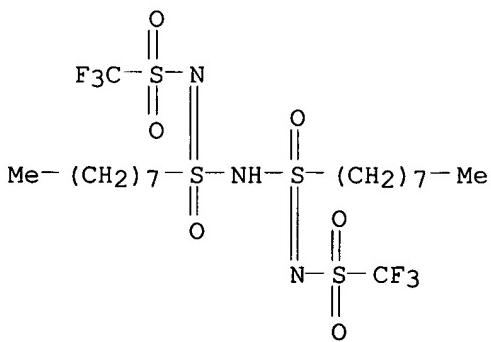
IT 220431-11-8P

RL: MOA (Modifier or additive use); PRP (Properties); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent); USES (Uses)

(salt conversion; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

RN 220431-11-8 HCAPLUS

CN Methanesulfonamide, 1,1,1-trifluoro-N-[S-octyl-N-[S-octyl-N-[(trifluoromethyl)sulfonyl]sulfonimidoyl]sulfonimidoyl]-, potassium salt (9CI) (CA INDEX NAME)



● K

IT 220431-07-2P 220431-15-2P 220431-25-4P

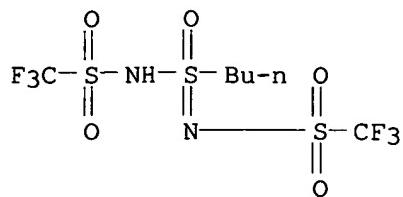
220431-32-3P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(salt conversion; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

RN 220431-07-2 HCAPLUS

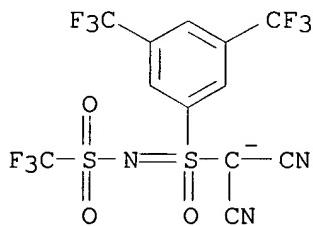
CN Methanesulfonamide, N-[S-butyl-N-[(trifluoromethyl)sulfonyl]sulfonimidoyl]-1,1,1-trifluoro-, potassium salt (9CI) (CA INDEX NAME)



● K

RN 220431-15-2 HCPLUS

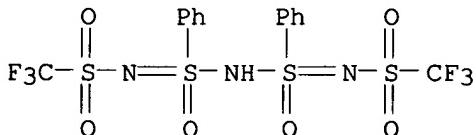
CN Propanedinitrile, [S-[3,5-bis(trifluoromethyl)phenyl]-N-[(trifluoromethyl)sulfonyl]sulfonimidoyl]-, ion(1-), sodium (9CI) (CA INDEX NAME)



● Na<sup>+</sup>

RN 220431-25-4 HCPLUS

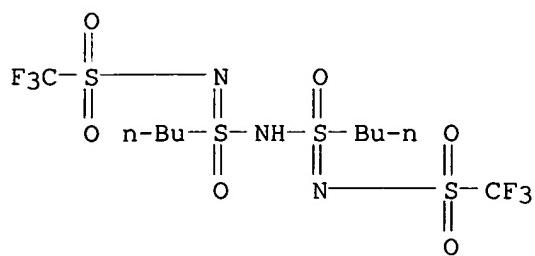
CN Methanesulfonamide, 1,1,1-trifluoro-N-[S-phenyl-N-[S-phenyl-N-[(trifluoromethyl)sulfonyl]sulfonimidoyl]sulfonimidoyl]-, potassium salt (9CI) (CA INDEX NAME)



● K

RN 220431-32-3 HCPLUS

CN Methanesulfonamide, N-[S-butyl-N-[S-butyl-N-[(trifluoromethyl)sulfonyl]sulfonimidoyl]sulfonimidoyl]-1,1,1-trifluoro-, potassium salt (9CI) (CA INDEX NAME)



● K

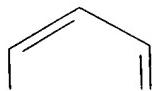
IT 220430-58-0P

RL: CAT (Catalyst use); PRP (Properties); SPN (Synthetic preparation);  
PREP (Preparation); USES (Uses)  
(soluble **polymerization** catalyst; preparation of delocalized anionic  
perfluorosulfonimide derivs. as conductors and catalysts)

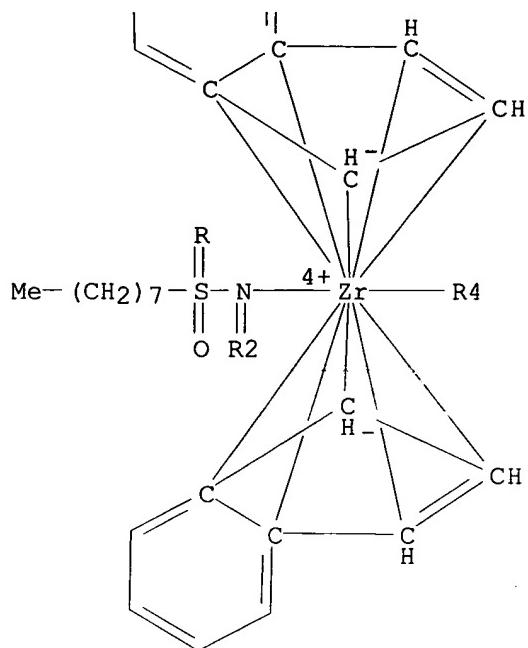
RN 220430-58-0 HCAPLUS

CN Zirconium, bis[1,1,1-trifluoro-N-[S-octyl-N-[S-octyl-N-  
[(trifluoromethyl)sulfonyl]sulfonimidoyl]sulfonimidoyl-  
kN]sulfonamidato]bis[(1,2,3,3a,7a-η)-1H-inden-1-yl]- (9CI) (CA  
INDEX NAME)

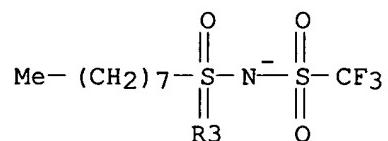
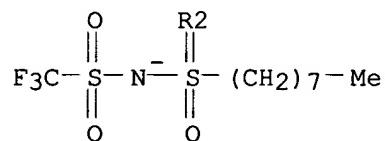
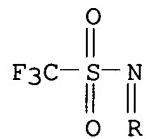
PAGE 1-A



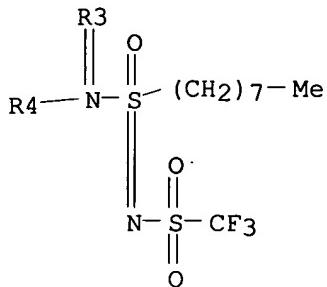
PAGE 2-A



PAGE 3-A



PAGE 4-A



IT 220431-42-5P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation) (solubility; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

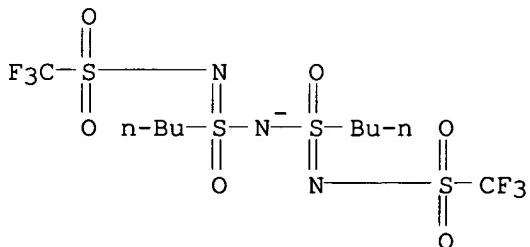
RN 220431-42-5 HCPLUS

CN Benzothiazolium, 3-ethyl-2-[7-(3-ethyl-2(3H)-benzothiazolylidene)-1,3,5-heptatrienyl]-, salt with N-[S-butyl-N-[(trifluoromethyl)sulfonyl]sulfonylimidoyl]-N'-(trifluoromethyl)sulfonyl]-1-butanesulfonimidamide (1:1) (9CI) (CA INDEX NAME)

CM 1

CRN 220431-37-8

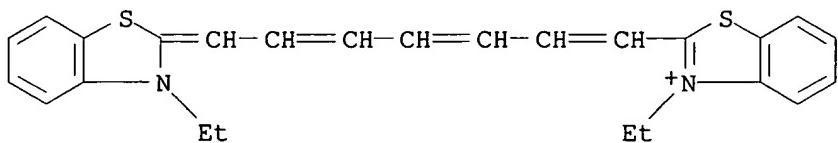
CMF C10 H18 F6 N3 O6 S4



CM 2

CRN 23178-68-9

CMF C25 H25 N2 S2



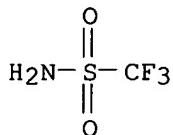
IT 421-85-2, Trifluoromethanesulfonamide

RL: RCT (Reactant); RACT (Reactant or reagent)

(sulfonamidation with butanesulfonyl chloride; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

RN 421-85-2 HCPLUS

CN Methanesulfonamide, 1,1,1-trifluoro- (6CI, 8CI, 9CI) (CA INDEX NAME)



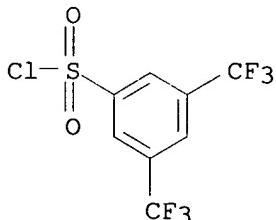
IT 39234-86-1, 3,5-Bis(trifluoromethyl)benzenesulfonyl chloride

RL: RCT (Reactant); RACT (Reactant or reagent)

(sulfonamidation with trifluoromethanesulfonamide; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

RN 39234-86-1 HCPLUS

CN Benzenesulfonyl chloride, 3,5-bis(trifluoromethyl)- (9CI) (CA INDEX NAME)



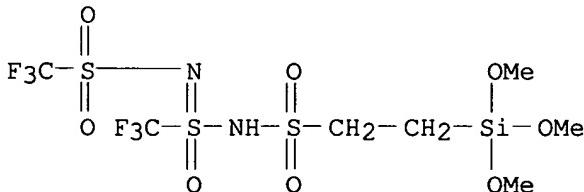
IT 220431-43-6P

RL: CAT (Catalyst use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(surface catalyst for silica; preparation of delocalized anionic perfluorosulfonimide derivs. as conductors and catalysts)

RN 220431-43-6 HCPLUS

CN Ethanesulfonamide, N-[S-(trifluoromethyl)-N-[(trifluoromethyl)sulfonyl]sulfonyimidoyl]-2-(trimethoxysilyl)-, potassium salt (9CI) (CA INDEX NAME)



● K

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L51 ANSWER 18 OF 37 HCPLUS COPYRIGHT 2005 ACS on STN

KATHLEEN FULLER EIC 1700 REMSEN 4B28 571/272-2505

AN 1998:466331 HCAPLUS  
 DN 129:136626  
 TI Salts of pentacyclic or tetraazapentalene-based anions for use as ionic conductors  
 IN Armand, Michel; Choquette, Yves; Gauthier, Michel; Michot, Christophe  
 PA Centre National de la Recherche Scientifique (CNRS), Fr.; Hydro-Quebec  
 SO Eur. Pat. Appl., 42 pp.  
 CODEN: EPXXDW  
 DT Patent  
 LA French  
 FAN.CNT 5

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 850933	A1	19980701	EP 1997-403188	19971230
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	CA 2194127	AA	19980630	CA 1996-2194127	19961230
	CA 2199231	AA	19980905	CA 1997-2199231	19970305
	CA 2244979	AA	19980709	CA 1997-2244979	19971230
	CA 2248242	AA	19980709	CA 1997-2248242	19971230
	CA 2248244	AA	19980709	CA 1997-2248244	19971230
	CA 2248246	AA	19980709	CA 1997-2248246	19971230
	CA 2248303	AA	19980709	CA 1997-2248303	19971230
	CA 2248304	AA	19980709	CA 1997-2248304	19971230
	WO 9829358	A2	19980709	WO 1997-CA1008	19971230
	WO 9829358	A3	19981008		
	W: CA, JP, US				
	RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	WO 9829399	A1	19980709	WO 1997-CA1009	19971230
	W: CA, JP, US				
	WO 9829389	A1	19980709	WO 1997-CA1010	19971230
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	EP 889863	A2	19990113	EP 1997-951051	19971230
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	EP 890176	A1	19990113	EP 1997-951052	19971230
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	R: DE, FR, GB, IT				
	JP 2000508114	T2	20000627	JP 1998-529517	19971230
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	US 6120696	A	20000919	US 1998-125792	19980828
	US 6171522	B1	20010109	US 1998-101811	19981119
	US 6333425	B1	20011225	US 1998-101810	19981119
	US 6228942	B1	20010508	US 1998-125798	19981202
	US 6395367	B1	20020528	US 1998-125799	19981202
	US 6319428	B1	20011120	US 1998-125797	19981203

US 6365068	B1	20020402	US 2000-609362	20000630
US 6576159	B1	20030610	US 2000-638793	20000809
US 2001024749	A1	20010927	US 2001-826941	20010406
US 6506517	B2	20030114		
US 2002009650	A1	20020124	US 2001-858439	20010516
US 2002102380	A1	20020801	US 2002-107742	20020327
US 6835495	B2	20041228		
US 2003052310	A1	20030320	US 2002-253035	20020924
US 2003066988	A1	20030410	US 2002-253970	20020924
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CA 1997-2199231	A	19970305		
EP 1997-403188	A3	19971230		
WO 1997-CA1008	W	19971230		
WO 1997-CA1009	W	19971230		
WO 1997-CA1010	W	19971230		
WO 1997-CA1011	W	19971230		
WO 1997-CA1012	W	19971230		
WO 1997-CA1013	W	19971230		
US 1998-101810	A3	19981119		
US 1998-101811	A3	19981119		
US 1998-125798	A3	19981202		
US 1998-125799	A3	19981202		
US 1998-125797	A1	19981203		
US 2000-638793	A1	20000809		
US 2001-858439	A1	20010516		

OS MARPAT 129:136626

GI For diagram(s), see printed CA Issue.

AB Salts of metals, NO<sup>+</sup>, H3O<sup>+</sup>, or NH4<sup>+</sup> with the heterocycles I [Xi = N, C, S or P derivs. (but ≤ 4 X = N)] or II (Y = electron-withdrawing group of specified structure) are ionic conductors, useful i.a., as catalysts for **polymerization** and other reactions or as colorants. The reaction of 1 mol aminoguanidine bicarbonate with 1.05 mol CF<sub>3</sub>CO<sub>2</sub>H in PhMe with azeotropic distn of H<sub>2</sub>O gave 92% 5-(trifluoromethyl)-1,3,4-triazole-2-amine, reaction of which with aqueous K<sub>2</sub>CO<sub>3</sub> gave 100% of the corresponding anion salt. Uses of the products in the above applications are exemplified.

IC ICM C07D249-04

ICS C07D233-90; C07D231-18; C07C255-46; C07D487-04; C07C317-44;  
C07F009-6584; C08G065-22; C08G077-04; C08F220-44; C09K003-00;  
H01M006-16; H01M010-40; C07B041-00; C08F004-00; C08J003-24

ICI C07D487-04, C07D249-00, C07D235-00

CC 35-3 (Chemistry of Synthetic High **Polymers**)

Section cross-reference(s): 28, 40, 67

ST ionic conductor heterocyclic; tetrapentalene salt ionic conductor; triazine salt ionic conductor; **polymn** catalyst ionic conductor; trifluoromethyltriazineamine salt ionic conductor; aminoguanidine reaction trifluoroacetic acid

IT Battery **electrolytes**(anionic heterocycle salts as battery **electrolytes**)

IT Fireproofing agents

Textiles

(anionic pyrazole derivative **polymers** as fireproofing agents for Gore-Tex)IT **Crosslinking** catalysts(anionic salts of heterocyclic compds. as **crosslinking** catalysts)IT Conducting **polymers**(anionic salts of heterocyclic compds. as **polymeric** elec. conductors)

IT **Polymerization catalysts**  
(anionic salts of heterocyclic compds. as **Polymerization catalysts**)

IT **Polymerization catalysts**  
(photopolymn.; anionic imidazole salts as photopolymn. catalysts)

IT 210469-94-6P  
RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation);  
USES (Uses)  
(preparation and use as **Polymerization catalyst**)

IT **210289-59-1P**  
RL: IMF (Industrial manufacture); TEM (Technical or engineered material  
use); PREP (Preparation); USES (Uses)  
(preparation as fireproofing agent for textiles)

IT **210289-54-6P**  
RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation);  
USES (Uses)  
(preparation as photochem. **Polymerization catalyst**)

IT **210289-48-8P**  
RL: IMF (Industrial manufacture); TEM (Technical or engineered material  
use); PREP (Preparation); USES (Uses)  
(preparation for use as surfactant)

IT 709-62-6P **64139-67-9P** 156118-35-3DP, Dimethylsilanediol-  
methylsilanediol copolymer, reaction products with  
(difluorobut enyl)cyanotriazole 210289-24-0P 210289-27-3P  
210289-38-6P 210289-52-4DP, reaction products with Me hydrogen  
polysiloxanes  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(preparation of)

IT **2926-27-4**, Potassium trifluoromethanesulfonate  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction with (trifluoromethyl)triazinediazonium salt)

IT 407-38-5P, 2,2,2-Trifluoroethyl trifluoroacetate **1648-99-3P**,  
2,2,2-Trifluoroethanesulfonyl chloride 13360-57-1P, Dimethylsulfamoyl  
chloride  
RL: IMF (Industrial manufacture); TEM (Technical or engineered material  
use); PREP (Preparation); USES (Uses)  
(reaction with dicyanoimidazole and benzoyl chloride)

IT **375-72-4**, Nonafluorobutanesulfonyl fluoride  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction with dicyanoimidazole and benzoyl chloride)

IT 110-61-2, **Succinonitrile**  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction with hexafluoroacetylacetone)

IT 1522-22-1, 1,1,1,5,5,5-Hexafluoro-2,4-pentanedione  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction with **succinonitrile**)

IT 77968-17-3  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction with **succinonitrile** and Li hydride)

IT **210470-00-1**  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction with thiopheneethanol)

IT **210289-29-5P** **210289-30-8P** **210289-31-9P**  
210289-32-0P 210289-33-1P 210289-34-2P 210289-36-4P 210289-39-7P  
210289-41-1P **210289-42-2P** 210289-43-3P **210289-44-4P**  
210289-45-5P 210289-49-9P **210289-57-9P** 210289-62-6P  
210469-88-8P 210469-89-9P 210469-95-7P **210469-97-9P**  
**210470-01-2P** **210470-02-3P**  
RL: IMF (Industrial manufacture); TEM (Technical or engineered material  
use); PREP (Preparation); USES (Uses)

(salts of pentacyclic or tetraazapentalene-based anions for use as ionic conductors)

IT 210469-91-3P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(salts of pentacyclic or tetraazapentalene-based anions for use as pH indicators in nonaq. media)

IT 210289-59-1P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(preparation as fireproofing agent for textiles)

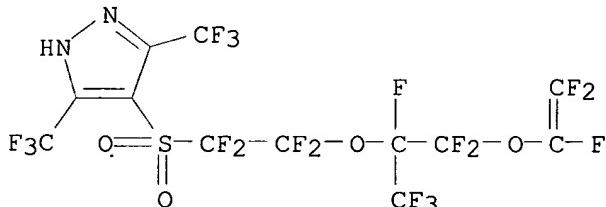
RN

1H-Pyrazole, 4-[[2-[1-[difluoro[(trifluoroethyl)oxy]methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoroethyl]sulfonyl]-3,5-bis(trifluoromethyl)-, potassium salt, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 210289-57-9

CMF C12 H F19 N2 O4 S . K



K

IT 210289-54-6P

RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation);  
USES (Uses)  
(preparation as photochem. **polymerization catalyst**)

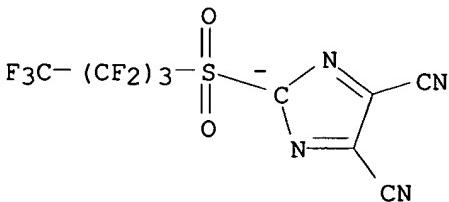
RN 210289-54-6 HCAPLUS

CN Iodonium, bis(4-dodecylphenyl)-, salt with 2-[(nonafluorobutyl)sulfonyl]-2H-imidazole-4,5-dicarbonitrile (1:1) (9CI) (CA INDEX NAME)

CM 1

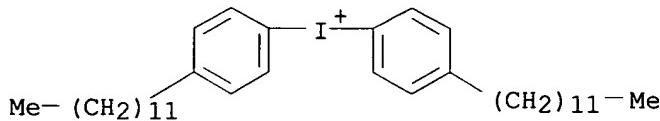
CRN 210289-53-5

CMF C9 F9 N4 O2 S



CM 2

CRN 71786-69-1  
CMF C36 H58 I

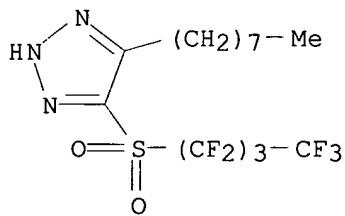


IT **210289-48-8P**

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(preparation for use as surfactant)

RN 210289-48-8 HCPLUS

CN 2H-1,2,3-Triazole, 4-[(nonafluorobutyl)sulfonyl]-5-octyl-, lithium salt  
(9CI) (CA INDEX NAME)



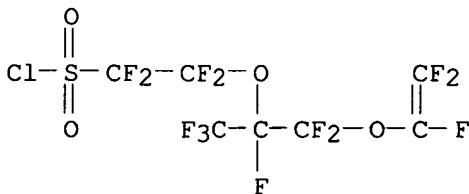
● Li

IT **64139-67-9P**

RL: IMF (Industrial manufacture); PREP (Preparation)  
(preparation of)

RN 64139-67-9 HCPLUS

CN Ethanesulfonyl chloride, 2-[1-[difluoro[(trifluoroethenyl)oxy]methyl]-  
1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro- (9CI) (CA INDEX NAME)

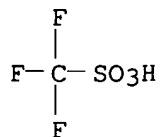


IT **2926-27-4**, Potassium trifluoromethanesulfonate

RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction with (trifluoromethyl)triazinediazonium salt)

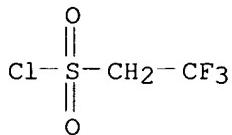
RN 2926-27-4 HCPLUS

CN Methanesulfonic acid, trifluoro-, potassium salt (8CI, 9CI) (CA INDEX NAME)

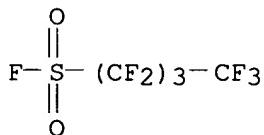


● K

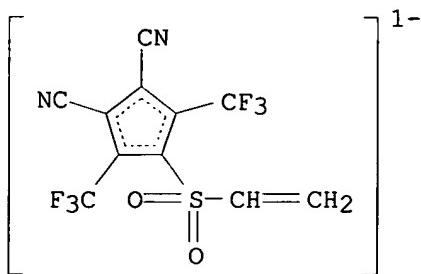
IT **1648-99-3P**, 2,2,2-Trifluoroethanesulfonyl chloride  
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(reaction with dicyanoimidazole and benzoyl chloride)  
RN 1648-99-3 HCPLUS  
CN Ethanesulfonyl chloride, 2,2,2-trifluoro- (7CI, 8CI, 9CI) (CA INDEX NAME)



IT **375-72-4**, Nonafluorobutanesulfonyl fluoride  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction with dicyanoimidazole and benzoyl chloride)  
RN 375-72-4 HCPLUS  
CN 1-Butanesulfonyl fluoride, 1,1,2,2,3,3,4,4,4-nonafluoro- (8CI, 9CI) (CA INDEX NAME)



IT **210470-00-1**  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction with thiopheneethanol)  
RN 210470-00-1 HCPLUS  
CN 1,3-Cyclopentadiene-1,2-dicarbonitrile, 4-(ethenylsulfonyl)-3,5-bis(trifluoromethyl)-, ion(1-), potassium (9CI) (CA INDEX NAME)



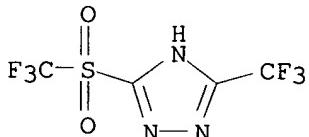
● K<sup>+</sup>

IT 210289-29-5P 210289-30-8P 210289-31-9P  
210289-42-2P 210289-44-4P 210289-57-9P  
210469-97-9P 210470-01-2P 210470-02-3P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(salts of pentacyclic or tetraazapentalene-based anions for use as ionic conductors)

RN 210289-29-5 HCPLUS

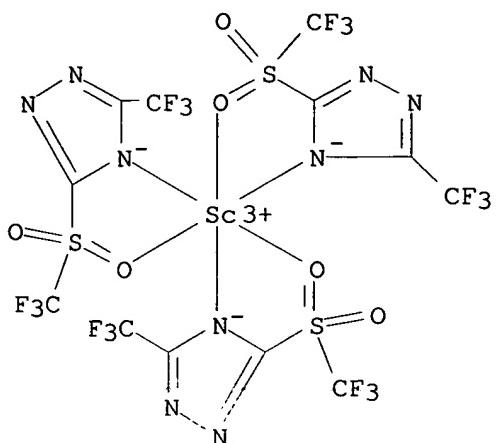
CN 1H-1,2,4-Triazole, 3-(trifluoromethyl)-5-[(trifluoromethyl)sulfonyl]-, potassium salt (9CI) (CA INDEX NAME)



● K

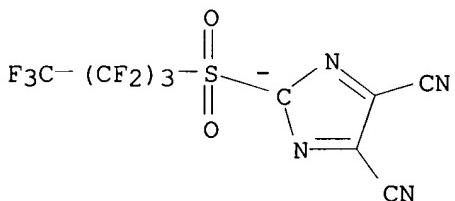
RN 210289-30-8 HCPLUS

CN Scandium, tris[3-(trifluoromethyl)-5-[(trifluoromethyl)sulfonyl-κO]-4H-1,2,4-triazolato-κN4]- (9CI) (CA INDEX NAME)



RN 210289-31-9 HCPLUS

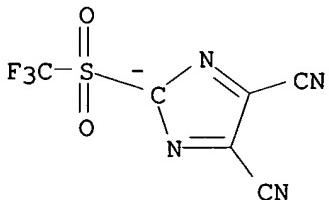
CN 2H-Imidazole-4,5-dicarbonitrile, 2-[ (nonafluorobutyl)sulfonyl]-, ion(1-),  
potassium (9CI) (CA INDEX NAME)



● K<sup>+</sup>

RN 210289-42-2 HCPLUS

CN 2H-Imidazole-4,5-dicarbonitrile, 2-[ (trifluoromethyl)sulfonyl]-, ion(1-),  
potassium (9CI) (CA INDEX NAME)

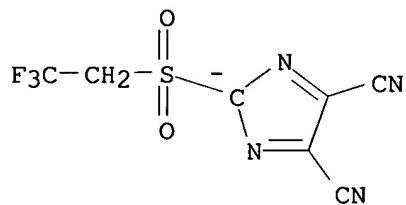


● K<sup>+</sup>

RN 210289-44-4 HCPLUS

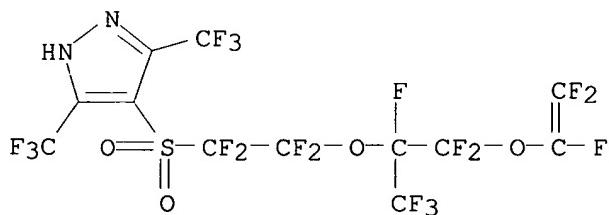
CN 2H-Imidazole-4,5-dicarbonitrile, 2-[ (2,2,2-trifluoroethyl)sulfonyl]-,

ion(1-), potassium (9CI) (CA INDEX NAME)

● K<sup>+</sup>

RN 210289-57-9 HCPLUS

CN 1H-Pyrazole, 4-[[2-[1-[(trifluoromethyl)sulfonyl]ethyl]oxy)methyl]-1,2,2,2-tetrafluoroethoxy-1,1,2,2-tetrafluoroethylsulfonyl]-3,5-bis(trifluoromethyl)-, potassium salt (9CI) (CA INDEX NAME)



● K

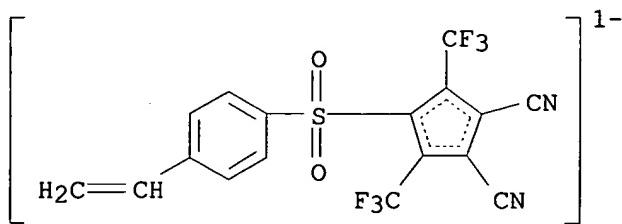
RN 210469-97-9 HCPLUS

CN 1,3-Cyclopentadiene-1,2-dicarbonitrile, 4-[(4-ethenylphenyl)sulfonyl]-3,5-bis(trifluoromethyl)-, ion(1-), lithium, polymer with 2-propenenitrile (9CI) (CA INDEX NAME)

CM 1

CRN 210469-96-8

CMF C17 H7 F6 N2 O2 S . Li



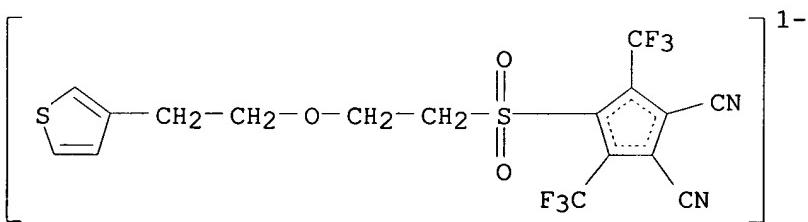
● Li<sup>+</sup>

CM 2

CRN 107-13-1  
CMF C3 H3 N

H<sub>2</sub>C=CH-C≡N

RN 210470-01-2 HCPLUS  
CN 1,3-Cyclopentadiene-1,2-dicarbonitrile, 4-[[2-[2-(3-thienyl)ethoxy]ethyl]sulfonyl]-3,5-bis(trifluoromethyl)-, ion(1-), potassium (9CI) (CA INDEX NAME)

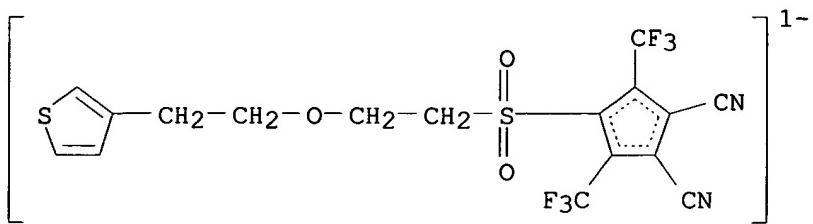


● K<sup>+</sup>

RN 210470-02-3 HCPLUS  
CN 1,3-Cyclopentadiene-1,2-dicarbonitrile, 4-[[2-[2-(3-thienyl)ethoxy]ethyl]sulfonyl]-3,5-bis(trifluoromethyl)-, ion(1-), potassium, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 210470-01-2  
CMF C17 H11 F6 N2 O3 S2 . K



● K<sup>+</sup>

IT 210469-91-3P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(salts of pentacyclic or tetraazapentalene-based anions for use as pH indicators in nonaq. media)

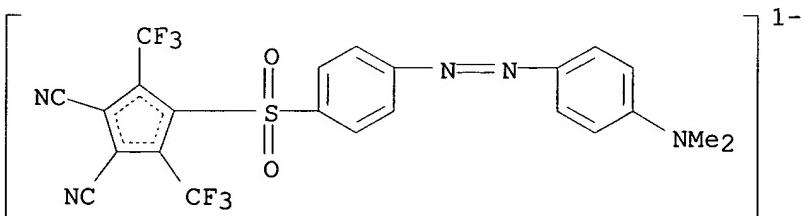
RN 210469-91-3 HCAPLUS

CN 1-Butanaminium, N,N,N-tributyl-, salt with 4-[[4-[[4-(dimethylamino)phenyl]azo]phenyl]sulfonyl]-3,5-bis(trifluoromethyl)-1,3-cyclopentadiene-1,2-dicarbonitrile (1:1) (9CI) (CA INDEX NAME)

CM 1

CRN 210469-90-2

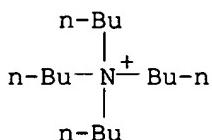
CMF C23 H14 F6 N5 O2 S



CM 2

CRN 10549-76-5

CMF C16 H36 N



RE.CNT 16 THERE ARE 16 CITED REFERENCES AVAILABLE FOR THIS RECORD  
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L51 ANSWER 19 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 1998:464361 HCAPLUS  
 DN 129:109417  
 TI Salts of malononitrile-based anions for use as ionic conductors  
 IN Armand, Michel; Choquette, Yves; Gauthier, Michel; Michot, Christophe  
 PA Centre National de la Recherche Scientifique (CNRS), Fr.; Hydro-Quebec  
 SO Eur. Pat. Appl., 49 pp.  
 CODEN: EPXXDW

DT Patent  
 LA French

FAN.CNT 5

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 850921	A1	19980701	EP 1997-403189	19971230
	EP 850921	B1	20020925		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	CA 2194127	AA	19980630	CA 1996-2194127	19961230
	CA 2199231	AA	19980905	CA 1997-2199231	19970305
	CA 2244979	AA	19980709	CA 1997-2244979	19971230
	CA 2248242	AA	19980709	CA 1997-2248242	19971230
	CA 2248244	AA	19980709	CA 1997-2248244	19971230
	CA 2248246	AA	19980709	CA 1997-2248246	19971230
	CA 2248303	AA	19980709	CA 1997-2248303	19971230
	CA 2248304	AA	19980709	CA 1997-2248304	19971230
	WO 9829358	A2	19980709	WO 1997-CA1008	19971230
	WO 9829358	A3	19981008		
	W: CA, JP, US				
	RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	WO 9829399	A1	19980709	WO 1997-CA1009	19971230
	W: CA, JP, US				
	WO 9829389	A1	19980709	WO 1997-CA1010	19971230
	W: CA, JP, US				
	WO 9829396	A1	19980709	WO 1997-CA1011	19971230
	W: CA, JP, US				
	WO 9829877	A1	19980709	WO 1997-CA1012	19971230
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	RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	WO 9829388	A1	19980709	WO 1997-CA1013	19971230
	W: CA, JP, US				
	EP 889863	A2	19990113	EP 1997-951051	19971230
	EP 889863	B1	20030507		
	R: DE, FR, GB, IT				
	EP 890176	A1	19990113	EP 1997-951052	19971230
	EP 890176	B1	20010620		
	R: DE, FR, GB, IT				
	JP 2000508114	T2	20000627	JP 1998-529517	19971230
	JP 2000508346	T2	20000704	JP 1998-529516	19971230
	JP 2000508676	T2	20000711	JP 1998-529514	19971230
	JP 2000508677	T2	20000711	JP 1998-529515	19971230
	JP 2000508678	T2	20000711	JP 1998-529518	19971230
	EP 1201650	A2	20020502	EP 2001-129670	19971230
	EP 1201650	A3	20040102		
	R: DE, FR, GB, IT				
	JP 2002514245	T2	20020514	JP 1998-529513	19971230
	US 6120696	A	20000919	US 1998-125792	19980828
	US 6171522	B1	20010109	US 1998-101811	19981119
	US 6333425	B1	20011225	US 1998-101810	19981119
	US 6228942	B1	20010508	US 1998-125798	19981202

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US 6365068	B1	20020402	US 2000-609362	20000630
US 6576159	B1	20030610	US 2000-638793	20000809
US 2001024749	A1	20010927	US 2001-826941	20010406
US 6506517	B2	20030114		
US 2002009650	A1	20020124	US 2001-858439	20010516
US 2002102380	A1	20020801	US 2002-107742	20020327
US 6835495	B2	20041228		
US 2003052310	A1	20030320	US 2002-253035	20020924
US 2003066988	A1	20030410	US 2002-253970	20020924
PRAI CA 1996-2194127	A	19961230		
CA 1997-2199231	A	19970305		
EP 1997-403189	A3	19971230		
WO 1997-CA1008	W	19971230		
WO 1997-CA1009	W	19971230		
WO 1997-CA1010	W	19971230		
WO 1997-CA1011	W	19971230		
WO 1997-CA1012	W	19971230		
WO 1997-CA1013	W	19971230		
US 1998-101810	A3	19981119		
US 1998-101811	A3	19981119		
US 1998-125798	A3	19981202		
US 1998-125799	A3	19981202		
US 1998-125797	A1	19981203		
US 2000-638793	A1	20000809		
US 2001-858439	A1	20010516		

OS MARPAT 129:109417

AB The title compds., of specified structure and also useful as **polymerization catalysts**, colorants, etc., are prepared Stirring 10 mmol each stearoyl chloride and malononitrile K salt in THF at room temperature for 24 h, filtering, and stirring the filtrate with 500 mg Li<sub>2</sub>CO<sub>3</sub> for 24 h gave >97% C<sub>17</sub>H<sub>35</sub>COC(CN)<sub>2</sub>- Lit+. Use of the products in the above applications is exemplified.

IC ICM C07C317-44  
 ICS C07C255-17; C07C255-65; C07C255-27; C07C255-05; C07C255-35;  
 C08F220-44; C07C255-31; C08G065-48; C08G073-06; C08G077-44;  
 C08G073-02; C07F017-02; C07F007-18; C07C311-02; C09K003-00;  
 H01M006-16; H01M010-40; C07B041-00; C08F004-00

CC 35-3 (Chemistry of Synthetic High **Polymers**)  
 Section cross-reference(s): 23, 40, 67

ST malononitrile deriv elec conductor; stearoylmalononitrile lithium salt;  
 stearoyl chloride reaction malononitrile; **polymn** catalyst  
 malononitrile deriv; coloring agent malononitrile deriv

IT Battery **electrolytes**  
 (malononitrile derivative salts as battery **electrolytes**)

IT **Crosslinking catalysts**  
 (malononitrile derivative salts as **crosslinking catalysts**)

IT **Plasticizers**  
 (malononitrile derivative salts as **plasticizers** for polar  
**polymers**)

IT Conducting **polymers**  
 (malononitrile derivative salts as **polymeric conductors**)

IT Polyelectrolytes  
 (malononitrile derivative salts as **polymeric electrolytes**)  
 )

IT **Polymerization catalysts**  
 (malononitrile derivative salts as **polymerization catalysts**)

IT **Crosslinking catalysts**

- (photochem.; malononitrile derivative salts as **crosslinking catalysts**)
- IT **773-15-9**  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(hydrolysis-decarboxylation)
- IT 937-14-4, 3-Chloroperoxybenzoic acid  
RL: **RCT (Reactant)**; RACT (Reactant or reagent)  
(peroxidn. of (allylsulfonyl)malononitrile K salt)
- IT **2127-74-4P**, 1,2,2,2-Tetrafluoroethanesulfonyl fluoride  
RL: IMF (Industrial manufacture); **RCT (Reactant)**; PREP  
(Preparation); RACT (Reactant or reagent)  
(preparation and reaction with bromododecane and malononitrile Na salt)
- IT **210043-77-9P**  
RL: IMF (Industrial manufacture); **RCT (Reactant)**; PREP  
(Preparation); RACT (Reactant or reagent)  
(preparation and reaction with malononitrile)
- IT 14418-84-9P, 2-Propenesulfonyl chloride 33939-62-7P  
RL: IMF (Industrial manufacture); **RCT (Reactant)**; PREP  
(Preparation); RACT (Reactant or reagent)  
(preparation and reaction with malononitrile K salt)
- IT 210043-33-7P  
RL: IMF (Industrial manufacture); **RCT (Reactant)**; PREP  
(Preparation); RACT (Reactant or reagent)  
(preparation and reaction with malononitrile Na salt)
- IT 1483-72-3, Diphenyliodonium chloride 2997-92-4 14635-75-7, Nitrosonium tetrafluoroborate 23178-68-9, 3,3'-Diethylthiatricarbocyanine  
RL: **RCT (Reactant)**; RACT (Reactant or reagent)  
(reaction with [bis(ethylhexyl)amino]sulfonyl)malononitrile K salt)
- IT 13637-84-8, Chlorosulfonyl fluoride  
RL: **RCT (Reactant)**; RACT (Reactant or reagent)  
(reaction with bis(ethylhexyl)amine and malononitrile K salt)
- IT 106-20-7, Bis(2-ethylhexyl)amine  
RL: **RCT (Reactant)**; RACT (Reactant or reagent)  
(reaction with chlorosulfonyl fluoride and malononitrile K salt)
- IT 1120-71-4, 1,3-Propanesultone  
RL: **RCT (Reactant)**; RACT (Reactant or reagent)  
(reaction with lithiated phenazine and malononitrile K salt)
- IT 92-82-0, Phenazine  
RL: **RCT (Reactant)**; RACT (Reactant or reagent)  
(reaction with lithium, propanesultone and malononitrile K salt)
- IT 98-61-3, 4-Iodobenzenesulfonyl chloride 506-68-3, Cyanogen bromide  
**677-25-8**, Ethenesulfonyl fluoride 2633-67-2  
RL: **RCT (Reactant)**; RACT (Reactant or reagent)  
(reaction with malononitrile)
- IT 67-42-5 81-88-9, Rhodamine B 112-76-5, Stearyl chloride 401-99-0,  
1,3-Dinitro-5-(trifluoromethyl)benzene 553-90-2, Dimethyl oxalate  
700-16-3, Pentafluoropyridine 38870-89-2, Methoxyacetyl chloride  
40724-67-2 53188-07-1, Trolox 56512-49-3 86688-96-2,  
1H-Pyrrole-3-acetic acid 210043-94-0  
RL: **RCT (Reactant)**; RACT (Reactant or reagent)  
(reaction with malononitrile K salt)
- IT **375-72-4**, Nonafluorobutanesulfonyl fluoride 1293-87-4,  
1,1'-Ferrocenedicarboxylic acid 2638-94-0, 4,4'-Azobis(4-cyanopentanoic acid) 21286-54-4 **29540-81-6** 39262-22-1  
RL: **RCT (Reactant)**; RACT (Reactant or reagent)

(reaction with **malononitrile** Li salt)

IT 7189-69-7, 1,1'-Sulfonyldiimidazole 10147-40-7, 1-Dodecanesulfonyl chloride  
 RL: RCT (**Reactant**); RACT (Reactant or reagent)  
 (reaction with **malononitrile** Na salt)

IT 20334-42-3, **Malononitrile** sodium salt  
 RL: RCT (**Reactant**); RACT (Reactant or reagent)  
 (reaction with polyethylene glycol sulfoalkyl ethers)

IT 81991-76-6, **Malononitrile** potassium salt  
 RL: RCT (**Reactant**); RACT (Reactant or reagent)  
 (reaction with stearoyl chloride)

IT 109-77-3, **Malononitrile**  
 RL: RCT (**Reactant**); RACT (Reactant or reagent)  
 (reaction with styrenesulfonyl chloride)

IT 78-08-0, Triethoxyvinylsilane 82985-35-1, Bis[3-trimethoxysilyl]propylamine  
 RL: RCT (**Reactant**); RACT (Reactant or reagent)  
 (reaction with sulfur dioxide and **malononitrile** K salt)

IT 143-15-7, 1-Bromododecane  
 RL: RCT (**Reactant**); RACT (Reactant or reagent)  
 (reaction with tetrafluoroethanesulfonyl fluoride and **malononitrile** Na salt)

IT 210043-40-6P  
 RL: IMF (Industrial manufacture); RCT (**Reactant**); PREP (Preparation); RACT (Reactant or reagent)  
 (salts of **malononitrile**-based anions for use as ionic conductors)

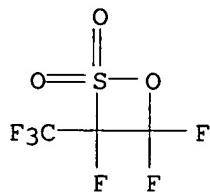
IT 156118-35-3DP, Dimethylsilanediol-methylsilanediol copolymer, reaction products with (vinylsulfonyl)malononitrile Li salt 162134-09-0DP, reaction products with (tetrafluoroethyl)sulfonyl fluoride and malononitrile Na salt 210043-22-4P **210043-24-6P** 210043-26-8P  
 210043-30-4P 210043-31-5P 210043-32-6P 210043-34-8P 210043-35-9P  
 210043-36-0P 210043-38-2P 210043-39-3P 210043-43-9P 210043-46-2P  
 210043-47-3P 210043-51-9P 210043-52-0P 210043-55-3P 210043-56-4P  
 210043-57-5P 210043-58-6P 210043-60-0DP, reaction products with Me hydrogen polysiloxanes 210043-61-1P 210043-62-2P 210043-63-3P  
 210043-65-5P 210043-66-6P 210043-67-7P 210043-69-9P 210043-70-2P  
 210043-71-3P **210043-72-4P** 210043-74-6P 210043-76-8P  
**210043-78-0P** **210043-79-1P** 210043-80-4P 210043-82-6P  
**210043-84-8P** 210043-85-9P 210043-87-1P 210043-88-2P  
 210043-89-3P 210043-90-6P 210043-91-7P 210043-92-8P 210043-93-9P  
 210043-95-1P 210043-97-3P 210043-98-4P 210043-99-5P 210044-02-3P  
 210044-03-4P  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (salts of **malononitrile**-based anions for use as ionic conductors)

IT 210043-64-4P  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (salts of **malononitrile**-based anions for use as **polymerization catalysts**)

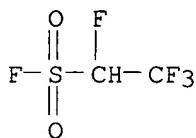
IT **773-15-9**  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (hydrolysis-decarboxylation)

RN 773-15-9 HCPLUS

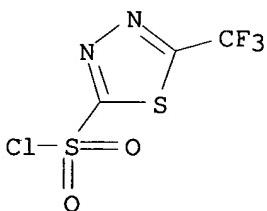
CN 1,2-Oxathietane, 3,4,4-trifluoro-3-(trifluoromethyl)-, 2,2-dioxide (8CI, 9CI) (CA INDEX NAME)



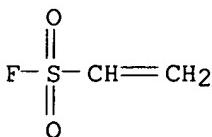
IT 2127-74-4P, 1,2,2,2-Tetrafluoroethanesulfonyl fluoride  
RL: IMF (Industrial manufacture); RCT (Reactant); PREP  
(Preparation); RACT (Reactant or reagent)  
(preparation and reaction with bromododecane and malononitrile Na  
salt)  
RN 2127-74-4 HCAPLUS  
CN Ethanesulfonyl fluoride, 1,2,2,2-tetrafluoro- (6CI, 7CI, 8CI, 9CI) (CA  
INDEX NAME)



IT 210043-77-9P  
RL: IMF (Industrial manufacture); RCT (Reactant); PREP  
(Preparation); RACT (Reactant or reagent)  
(preparation and reaction with malononitrile)  
RN 210043-77-9 HCAPLUS  
CN 1,3,4-Thiadiazole-2-sulfonyl chloride, 5-(trifluoromethyl)- (9CI) (CA  
INDEX NAME)



IT 677-25-8, Ethenesulfonyl fluoride  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction with malononitrile)  
RN 677-25-8 HCAPLUS  
CN Ethenesulfonyl fluoride (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

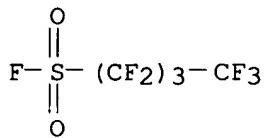


IT 375-72-4, Nonnafluorobutanesulfonyl fluoride 29540-81-6

RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction with malononitrile Li salt)

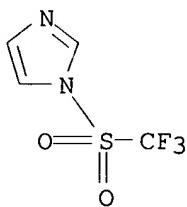
RN 375-72-4 HCPLUS

CN 1-Butanesulfonyl fluoride, 1,1,2,2,3,3,4,4,4-nonafluoro- (8CI, 9CI) (CA INDEX NAME)



RN 29540-81-6 HCPLUS

CN 1H-Imidazole, 1-[(trifluoromethyl)sulfonyl]- (9CI) (CA INDEX NAME)



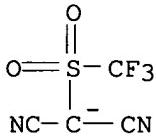
IT 210043-24-6P 210043-72-4P 210043-78-0P

210043-79-1P 210043-84-8P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(salts of malononitrile-based anions for use as ionic conductors)

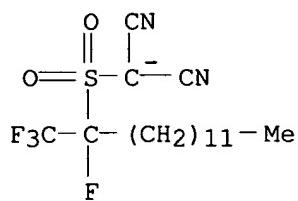
RN 210043-24-6 HCPLUS

CN Propanedinitrile, [(trifluoromethyl)sulfonyl]-, ion(1-), lithium (9CI) (CA INDEX NAME)

● Li<sup>+</sup>

RN 210043-72-4 HCPLUS

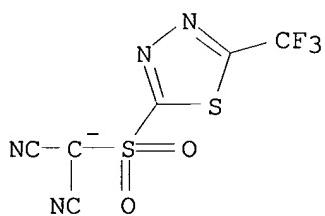
CN Propanedinitrile, [[1-fluoro-1-(trifluoromethyl)tridecyl]sulfonyl]-, ion(1-), potassium (9CI) (CA INDEX NAME)



● K<sup>+</sup>

RN 210043-78-0 HCAPLUS

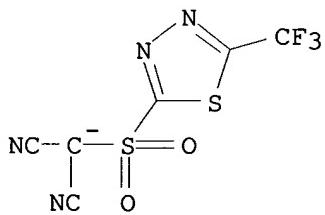
CN Propanedinitrile, [[5-(trifluoromethyl)-1,3,4-thiadiazol-2-yl]sulfonyl]-, ion(1-), lithium (9CI) (CA INDEX NAME)



● Li<sup>+</sup>

RN 210043-79-1 HCAPLUS

CN Propanedinitrile, [(5-(trifluoromethyl)-1,3,4-thiadiazol-2-yl)sulfonyl]-, ion(1-), potassium (9CI) (CA INDEX NAME)



● K<sup>+</sup>

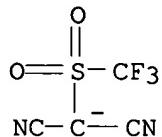
RN 210043-84-8 HCPLUS

CN 1H-Imidazolium, 1-ethyl-3-methyl-, salt with [(trifluoromethyl)sulfonyl]propylbenzonitrile (1:1) (9CI) (CA INDEX NAME)

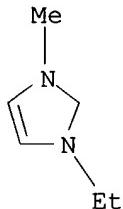
CM 1

CRN 210043-83-7

CMF C4 F3 N2 O2 S



CM 2

CRN 65039-03-4  
CMF C6 H11 N2

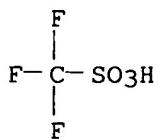
ONE OR MORE TAUTOMERIC DOUBLE BONDS NOT DISPLAYED IN THE STRUCTURE  
 RE.CNT 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 ALL CITATIONS AVAILABLE IN THE RE FORMAT

L51 ANSWER 20 OF 37 HCPLUS COPYRIGHT 2005 ACS on STN  
 AN 1997:425987 HCPLUS  
 DN 127:109378  
 TI **Polymerization** of cyclic ethers using selected metal compound catalysts  
 IN Drysdale, Neville Everton  
 PA du Pont de Nemours, E. I., and Co., USA  
 SO U.S., 7 pp., Cont.-in-part of U.S. Ser. No. 331,305, abandoned.  
 CODEN: USXXAM  
 DT Patent  
 LA English  
 FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 5641853	A	19970624	US 1996-608340	19960228
	CN 1179786	A	19980422	CN 1995-195937	19951024
	CN 1092682	B	20021016		
	EP 1046663	A2	20001025	EP 2000-202233	19951024
	EP 1046663	A3	20010912		
	EP 1046663	B1	20030611		
	R: DE, ES, FR, GB, NL				
	ES 2180659	T3	20030216	ES 1995-938289	19951024
	ES 2200778	T3	20040316	ES 2000-202233	19951024
PRAI	US 1994-331305	B2	19941028		
	EP 1995-938289	A3	19951024		
OS	MARPAT 127:109378				
AB	The title process comprises contacting, at -80° to +90°, ≥1 THF, oxepane, 1,3-dioxolane or 1,3,5-trioxane with MZsQr and, as				

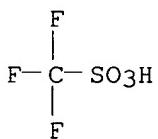
accelerator, a vinyl ester, R23PO2H, R23POHX, (R3O)3P, R23PX, or a **hexahalophosphonitrile trimer**. In the above formulas, R2 is H or (substituted) hydrocarbyl in which the substituent does not react with the starting materials or products and does not interfere with the **polymerization**; each R3 is independently (substituted) hydrocarbyl in which the substituent does not react with the starting materials or products and does not interfere with the **polymerization**; each X is independently Cl, Br, or I; M is strontium, barium, scandium, yttrium, the rare earth metals, titanium, zirconium, hafnium, chromium, molybdenum, tantalum, rhenium, iron, cobalt, vanadium, niobium, tungsten, ruthenium, osmium, rhodium, iridium, palladium, platinum, copper, silver, gold, zinc, cadmium, mercury, aluminum, gallium, indium, thulium, germanium, tin, mischmetal, lead, arsenic, antimony and bismuth; at least one of Z is a sulfo- and perfluoroalkyl-containing anion and remaining Z is oxo or  $\geq 1$  monovalent anion; s = 1-6 based on the metal; Q is a neutral ligand; t = 0-6. THF was **polymerized** using di-Et chlorophosphite and ytterbium triflate catalysts.

IC ICM C08G065-16  
 ICS C08G065-20; C07C041-01; C07C041-16  
 NCL 528233000  
 CC 35-7 (Chemistry of Synthetic High **Polymers**)  
 ST cyclic ether **polymn** metal catalyst; phosphorus compd accelerator  
**polymn**; polyoxyalkylene manuf metal catalyst  
 IT **Polymerization**  
     **Polymerization** catalysts  
     (**Polymerization** of cyclic ethers using selected metal compound catalysts)  
 IT Polyoxyalkylenes, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
     (**Polymerization** of cyclic ethers using selected metal compound catalysts)  
 IT 94-04-2, Vinyl 2-Ethylhexanoate 108-05-4, Vinyl Acetate, uses  
 291-37-2, **Phosphonitrile trimer** 589-57-1, Diethyl Chlorophosphite 1707-03-5, Diphenylphosphinic Acid **34622-08-7**, Neodymium Triflate **52093-26-2**, Lanthanum Triflate **52093-30-8**, Yttrium Triflate **54761-04-5**, Ytterbium Triflate **62086-02-6** **88189-03-1** **89672-77-5** **139177-62-1**, Dysprosium Triflate **139177-64-3**, Erbium Triflate  
 RL: CAT (Catalyst use); USES (Uses)  
     (**Polymerization** of cyclic ethers using selected metal compound catalysts)  
 IT 24979-97-3P, THF homopolymer  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
     (**Polymerization** of cyclic ethers using selected metal compound catalysts)  
 IT **34622-08-7**, Neodymium Triflate **52093-26-2**, Lanthanum Triflate **52093-30-8**, Yttrium Triflate **54761-04-5**, Ytterbium Triflate **62086-02-6** **88189-03-1** **89672-77-5** **139177-62-1**, Dysprosium Triflate **139177-64-3**, Erbium Triflate  
 RL: CAT (Catalyst use); USES (Uses)  
     (**Polymerization** of cyclic ethers using selected metal compound catalysts)  
 RN 34622-08-7 HCPLUS  
 CN Methanesulfonic acid, trifluoro-, neodymium(3+) salt (9CI) (CA INDEX NAME)



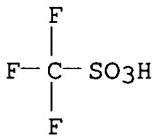
●1/3 Nd(III)

RN 52093-26-2 HCPLUS  
CN Methanesulfonic acid, trifluoro-, lanthanum(3+) salt (9CI) (CA INDEX NAME)



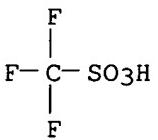
●1/3 La(III)

RN 52093-30-8 HCPLUS  
CN Methanesulfonic acid, trifluoro-, yttrium(3+) salt (9CI) (CA INDEX NAME)



●1/3 Y(III)

RN 54761-04-5 HCPLUS  
CN Methanesulfonic acid, trifluoro-, ytterbium(3+) salt (9CI) (CA INDEX NAME)

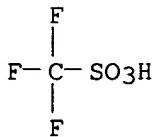


●1/3 Yb(III)

RN 62086-02-6 HCPLUS

KATHLEEN FULLER EIC 1700 REMSEN 4B28 571/272-2505

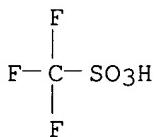
CN Methanesulfonic acid, trifluoro-, tin(4+) salt (9CI) (CA INDEX NAME)



● 1/4 Sn (IV)

RN 88189-03-1 HCAPLUS

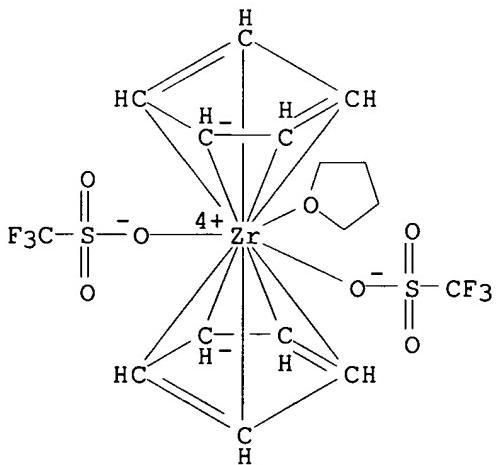
CN Methanesulfonic acid, trifluoro-, bismuth(3+) salt (9CI) (CA INDEX NAME)



### ● 1/3 Bi(III)

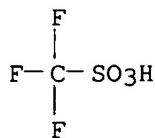
RN 89672-77-5 HCAPLUS

CN Zirconium, bis( $\eta$ 5-2,4-cyclopentadien-1-yl)(tetrahydrofuran)bis(trifluoromethanesulfonato- $\kappa$ O)-, stereoisomer (9CI) (CA INDEX NAME)



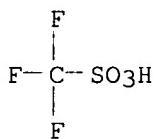
RN 139177-62-1 HCAPLUS

CN Methanesulfonic acid, trifluoro-, dysprosium(3+) salt (9CI) (CA INDEX NAME)



## ●1/3 Dy(III)

RN 139177-64-3 HCPLUS  
 CN Methanesulfonic acid, trifluoro-, erbium(3+) salt (9CI) (CA INDEX NAME)



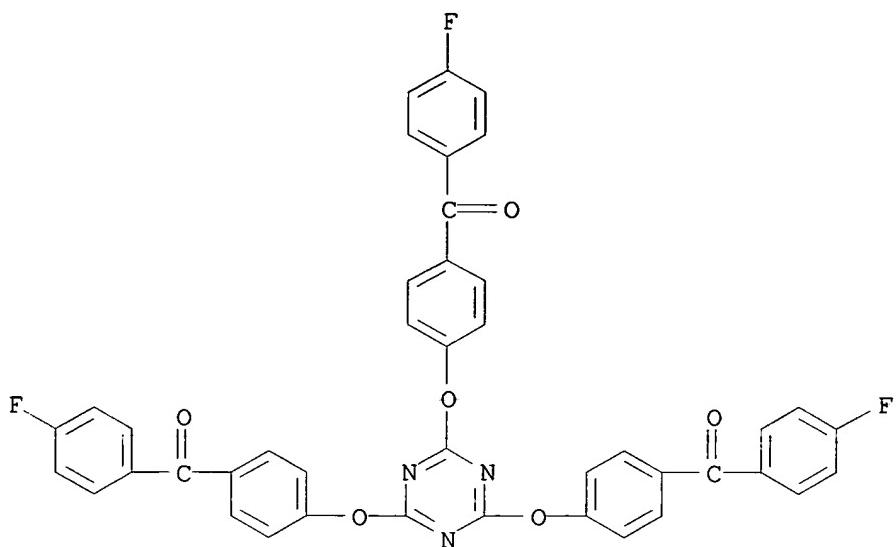
## ●1/3 Er(III)

L51 ANSWER 21 OF 37 HCPLUS COPYRIGHT 2005 ACS on STN  
 AN 1997:265565 HCPLUS  
 DN 126:252329  
 TI Radiation-crosslinkable elastomers and acetophenone and benzoylphenone photocrosslinkers therefor  
 IN Stark, Peter A.; Stewart, Edward G.; Everaerts, Albert I.  
 PA Minnesota Mining and Manufacturing Co., USA  
 SO PCT Int. Appl., 34 pp.  
 CODEN: PIXXD2  
 DT Patent  
 LA English  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 9707161	A1	19970227	WO 1996-US13138	19960812
	W: AU, CA, JP, KR, MX				
	RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	US 6369123	B1	20020409	US 1995-514677	19950814
	CA 2227542	AA	19970227	CA 1996-2227542	19960812
	AU 9667239	A1	19970312	AU 1996-67239	19960812
	EP 832156	A1	19980401	EP 1996-927411	19960812
	EP 832156	B1	20000322		
	R: BE, CH, DE, FR, GB, IT, LI, NL				
	JP 11501352	T2	19990202	JP 1996-509430	19960812
	JP 2974417	B2	19991110		
PRAI	US 1995-514677	A	19950814		
	WO 1996-US13138	W	19960812		
AB	Radiation-crosslinkable elastomeric compns., useful as adhesives, coatings, sealants, etc., contain (a) an elastomeric <b>polymer</b> containing abstractable H atoms to enable the elastomeric <b>polymer</b> to crosslink in the presence of a radiation-activatable crosslinking agent;				

and (b) a radiation-activatable crosslinking agent  $[XC(:O)p-C_6H_4W]nZ$ , where X is Me, (un)substituted Ph; W = O, NH, or S; Z is an organic spacer selected from aliphatic, aromatic, aralkyl, heteroarom., and cycloaliph. groups free of esters, amides, ketones, urethanes, and also free of ethers, thiols, allylic groups, and benzylic groups with H atoms intramol. accessible to the carbonyl group(s); and n ≥ 2. The polyfunctional acetophenones and benzophenones have decreased volatility and O sensitivity, increased compatibility, do not evolve toxic or corrosive byproducts, and can be used as post-curing crosslinking additives. Addnl., they are easily prepared from lower cost starting materials and have improved crosslink efficiency. 2,4,6-Tri(4-benzoylphenoxy)-1,3,5-triazine was prepared from 4-hydroxybenzophenone and cyanuric chloride and used (0.1 weight%) to cure a solvent-borne 5:95 acrylic acid-isooctyl acrylate copolymer adhesive system containing 0.05 weight% CBr4 on primed PET with 160 mJ/cm<sup>2</sup> UV irradiation, giving peel strength (ASTM D 3330-87) 69.0 N/dm.

- IC ICM C08K005-3492  
 ICS C08K005-5399; C08K005-07; C08L021-00  
 CC 39-10 (Synthetic Elastomers and Natural Rubber)  
 Section cross-reference(s): 38, 42  
 IT 188578-94-1P **188578-99-6P**  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (crosslinker; radiation-crosslinkable elastomers and acetophenone and benzoylphenone photocrosslinkers therefor)  
 IT 52206-95-8P, 1,4-Bis(4-benzoylphenoxy)butane 64167-89-1P 84039-16-7P  
 142689-54-1P 188578-93-0P 188578-95-2P 188578-97-4P  
**188578-98-5P**  
 RL: IMF (Industrial manufacture); MOA (Modifier or additive use); PREP (Preparation); USES (Uses)  
 (crosslinker; radiation-crosslinkable elastomers and acetophenone and benzoylphenone photocrosslinkers therefor)  
 IT **108-77-0**, Cyanuric chloride 110-52-1, 1,4-Dibromobutane  
 111-24-0, 1,5-Dibromopentane 143-33-9, Sodium cyanide 623-24-5,  
 1,4-Bis(bromomethyl)benzene 626-15-3, 1,3-Bis(bromomethyl)benzene  
 1137-42-4, 4-Hydroxybenzophenone 4101-68-2, 1,10-Dibromodecane  
 4549-33-1, 1,9-Dibromononane 16422-79-0, **Phosphonitrile**  
 chloride **trimer** 16696-65-4, 1,11-Dibromoundecane 25913-05-7,  
**4-Fluoro-4'-hydroxybenzophenone**  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (reactant in photocrosslinker preparation; radiation-crosslinkable elastomers and acetophenone and benzoylphenone photocrosslinkers therefor)  
 IT **188578-99-6P**  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (crosslinker; radiation-crosslinkable elastomers and acetophenone and benzoylphenone photocrosslinkers therefor)  
 RN 188578-99-6 HCPLUS  
 CN Methanone, [1,3,5-triazine-2,4,6-triyltris(oxy-4,1-phenylene)]tris[(4-fluorophenyl)- (9CI) (CA INDEX NAME)

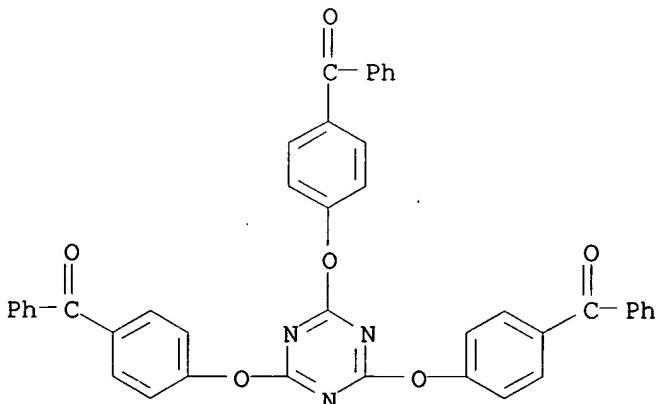


IT 188578-98-5P

RL: IMF (Industrial manufacture); MOA (Modifier or additive use); PREP (Preparation); USES (Uses)  
(crosslinker; radiation-crosslinkable elastomers and acetophenone and benzoylphenone photocrosslinkers therefor)

RN 188578-98-5 HCAPLUS

CN Methanone, [1,3,5-triazine-2,4,6-triyltris(oxy-4,1-phenylene)]tris[phenyl-(9CI) (CA INDEX NAME)]

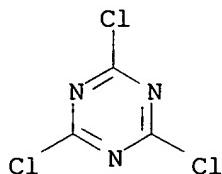


IT 108-77-0, Cyanuric chloride

RL: RCT (Reactant); RACT (Reactant or reagent)  
(reactant in photocrosslinker preparation; radiation-crosslinkable elastomers and acetophenone and benzoylphenone photocrosslinkers therefor)

RN 108-77-0 HCAPLUS

CN 1,3,5-Triazine, 2,4,6-trichloro- (9CI) (CA INDEX NAME)

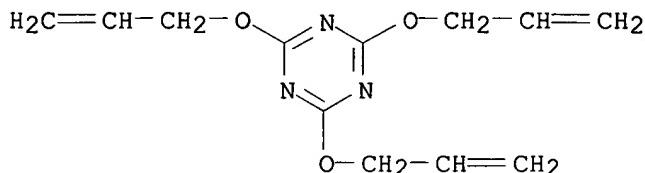


L51 ANSWER 22 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
AN 1995:820024 HCAPLUS  
DN 123:233292  
TI Performance of differently cross-linked, partially **fluorinated** proton exchange **membranes** in **polymer** **electrolyte** fuel cells  
AU Buechi, Felix N.; Gupta, Bhuvanesh; Haas, Otto; Scherer, Guenther G.  
CS Laboratory for Energy and Process Technology, Paul Scherrer Inst., Villigen-PSI, CH-5232, Switz.  
SO Journal of the Electrochemical Society (1995), 142(9), 3044-8  
CODEN: JESOAN; ISSN: 0013-4651  
PB Electrochemical Society  
DT Journal  
LA English  
AB A series of differently cross-linked FEP-g-polystyrene proton exchange **membranes** has been synthesized by the preirradn. grafting method [FEP: poly(tetrafluoroethylene-co-hexafluoropropylene)]. Divinylbenzene (DVB) and/or triallyl cyanurate (TAC) were used as cross-linkers in the **membranes**. It was found that the phys. properties of the **membranes**, such as water-uptake and specific resistance, are strongly influenced by the nature of the crosslinker. Generally it can be stated that DVB decreases water-uptake and increases specific resistance; on the other hand TAC increases swelling and decreases specific resistance to values as low as 5.0 Ω cm at 60°. The **membranes** were tested in H<sub>2</sub>/O<sub>2</sub> fuel cells for stability and performance. It was found that thick (170 μm) DVB crosslinked **membranes** showed stable operation for 1400 h at temps. up to 80°. The highest power d. in the fuel cell was found for the DVB and TAC double-cross-linked **membrane**; it exceeded the value of a cell with a Nafion 117 **membrane** by more than 60%.  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38  
ST **fluorinated** proton exchange **membrane** fuel cell;  
**polymer** **electrolyte** fuel cell  
IT Fuel-cell **electrolytes**  
(performance of differently cross-linked, partially **fluorinated** proton exchange **membranes** in **polymer** **electrolyte** fuel cells)  
IT 101-37-1, Triallyl cyanurate 1321-74-0, Divinylbenzene, uses  
RL: NUU (Other use, unclassified); USES (Uses)  
(cross-linker; performance of differently cross-linked, partially **fluorinated** proton exchange **membranes** in **polymer** **electrolyte** fuel cells)  
IT 125649-63-0D, sulfonated  
RL: DEV (Device component use); USES (Uses)  
(performance of differently cross-linked, partially **fluorinated** proton exchange **membranes** in **polymer** **electrolyte** fuel cells)  
IT 101-37-1, Triallyl cyanurate

RL: NUU (Other use, unclassified); USES (Uses)  
(cross-linker; performance of differently cross-linked, partially  
**fluorinated proton exchange membranes** in  
**polymer electrolyte** fuel cells)

RN 101-37-1 HCAPLUS

CN 1,3,5-Triazine, 2,4,6-tris(2-propenyoxy)- (9CI) (CA INDEX NAME)



L51 ANSWER 23 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
AN 1995:708842 HCAPLUS  
DN 123:79014  
TI Ion sensor  
IN Yamashita, Koutarou; Taki, Mamoru; Miyahara, Yuji; Fujii, Toshiko; Ozawa, Satoshi; Watanabe, Yoshio  
PA Hitachi, Ltd., Japan  
SO Eur. Pat. Appl., 34 pp.  
CODEN: EPXXDW  
DT Patent  
LA English  
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 661535 R: DE, GB, NL JP 07167825 JP 07167826 US 5472590	A1 A2 A2 A	19950705 19950704 19950704 19951205	EP 1994-119430 JP 1993-315080 JP 1993-315081 US 1994-354643	19941208 19931215 19931215 19941213
PRAI	JP 1993-315080 JP 1993-315081	A A	19931215 19931215		
AB	An ion sensor having an ion selectivity comprises an internal electrode of metal/metal salt, composed of an electroconductive layer of at least one metal and a layer of an insol. salt of the metal in contact with the electroconductive layer, an ion selective <b>membrane</b> whose supporting <b>membrane</b> is composed of a hydrophobic <b>polymer</b> , and an intermediate layer capable of keeping water mols. provided between the internal solid electrode and the ion selective <b>membrane</b> . The organic compound having a water-keeping property is polymethylene glycol, polyethylene glycol or polypropylene glycol, each having a mol. weight of 200-600. The inorg. compound having a water-keeping property is calcium chloride, gold chloride, magnesium perchlorate, magnesium <b>fluoride</b> or vanadium chloride dioxide. The ion sensor is suitable for anal. of specific ion species in a biol. fluid with practically prolonged maintenance of properties of the electrode.				
IC	ICM G01N027-333 ICS G01N027-414				
CC	9-1 (Biochemical Methods) Section cross-reference(s): 72, 76				
IT	Anions Body fluid Cations				

## Electrodes

**Electrolytes, biological**

(ion sensor for body fluid anal.)

- IT 56-81-5, Glycerol, analysis 57-14-7, N,N-Dimethylhydrazine 59-67-6, Pyridine-3-carboxylic acid, analysis 91-19-0, Quinoxaline 91-22-5, Quinoline, analysis 96-77-5, Phenol-2,4-disulfonic acid 107-21-1, Ethylene glycol, analysis 110-86-1, Pyridine, analysis 119-65-3, Isoquinoline 141-43-5, 2-Aminoethanol, analysis 260-94-6, Acridine 289-80-5, Pyridazine 290-37-9, Pyrazine 290-87-9, s-Triazine 586-95-8, 4-Pyridinemethanol 626-03-9, 2,4-Pyridinediol 632-07-5, 2-Cyanopropionic acid 4358-26-3 5552-44-3, Diethyl pyridine-2,5-dicarboxylate 7447-40-7, Potassium chloride, analysis 7601-89-0, Sodium perchlorate 7647-14-5, Sodium chloride, analysis 7783-40-6, Magnesium **fluoride** 7785-23-1, Silver bromide 9002-89-5, Polyvinyl alcohol 9003-01-4D, Polyacrylic acid, salts 9004-32-4, Carboxymethylcellulose 9015-98-9, Polymethylene glycol 10034-81-8, Magnesium perchlorate 10043-52-4, Calcium chloride, analysis 11118-27-7, Gold chloride 13759-30-3, Vanadium chloride oxide (VCLO<sub>2</sub>) 13940-63-1, Germanium **difluoride** 25087-26-7D, Polymethacrylic acid, salts 25322-68-3, Polyethylene glycol 25322-69-4, Polypropylene oxide 50851-57-5D, Polystyrenesulfonic acid, salts  
 RL: ARU (Analytical role, unclassified); DEV (Device component use); ANST (Analytical study); USES (Uses)  
 (ion sensor for body fluid anal.)
- IT 290-87-9, s-Triazine  
 RL: ARU (Analytical role, unclassified); DEV (Device component use); ANST (Analytical study); USES (Uses)  
 (ion sensor for body fluid anal.)
- RN 290-87-9 HCPLUS
- CN 1,3,5-Triazine (9CI) (CA INDEX NAME)



- L51 ANSWER 24 OF 37 HCPLUS COPYRIGHT 2005 ACS on STN  
 AN 1992:183474 HCPLUS  
 DN 116:183474  
 TI Electrochemical synthesis of new **polymeric** reagents  
 AU Tabakovic, R.; Gunic, E.; Tabakovic, I.; Zupan, M.  
 CS Fac. Technol., Djuro Pucar Stari Univ., Banjaluka, 78000, Yugoslavia  
 SO Electrochimica Acta (1992), 37(4), 751-5  
 CODEN: ELCAAV; ISSN: 0013-4686  
 DT Journal  
 LA English  
 AB **Crosslinked** poly[styrene-4-vinyl N-methylpyridinium iodide] (1Me-PVPI), poly[styrene-4-vinylpyridinium hydroiodide] (PVPHI) and derivs. were transformed to new **polymeric** reagents, differing in anions, by using a supporting **electrolyte** carrying the desired anion through anodic oxidation of the released iodide at a controlled potential. The exchange reaction was studied by means of electroanal. techniques. A new and simple electrochem. method for the synthesis of oxidizing, reducing, nucleophilic and acidic **polymeric** reagents is described.  
 CC 72-4 (Electrochemistry)

Section cross-reference(s): 35, 36

ST styrene vinylalkylpyridinium iodide electrooxidn counteranion replacement; iodine generation **polymer** counter anion replacement; hydriodide styrenevinylpyridinium **polymer** electrooxidn; anion exchange iodide **polymer** synthesis electrooxidn

IT Anion exchange  
(in **polymer** electrochem. synthesis)

IT Oxidation, electrochemical  
(of iodide counterion of styrene-vinyl alkylpyridinium iodide copolymer in acetonitrile with iodine generation in supporting **electrolyte** with desired anion)

IT 56-34-8, Tetraethylammonium chloride 733-44-8, Tetraethylammonium-p-toluene sulfonate) 7789-23-3, Potassium fluoride (KF) 13755-29-8  
**35895-69-3**, Tetraethylammonium trifluoromethane sulfonate  
RL: PRP (Properties)  
(electrochem. of **polymeric** reagents in organic solvent containing)

IT 7553-56-2P, Iodine, preparation  
RL: FORM (Formation, nonpreparative); PREP (Preparation)  
(formation of, in electrochem. oxidation of iodide styrene vinyl alkyl pyridinium iodide copolymer in acetonitrile containing supporting **electrolyte** with desired anion)

IT 140483-26-7 140483-27-8 140483-28-9  
RL: RCT (**Reactant**); RACT (Reactant or reagent)  
(oxidation of, electrochem., iodine generation in, in **acetonitrile** containing desired anion)

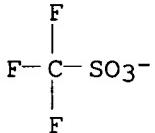
IT 140483-26-7DP, ion-exchanged, **crosslinked** 140483-27-8DP,  
ion-exchanged, **crosslinked** 140483-28-9DP, ion-exchanged,  
**crosslinked**  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(preparation of, by electrochem. oxidation of **polymer** with iodide counterion in acetonitrile containing supporting **electrolyte** with desired anion)

IT **35895-69-3**, Tetraethylammonium trifluoromethane sulfonate  
RL: PRP (Properties)  
(electrochem. of **polymeric** reagents in organic solvent containing)

RN 35895-69-3 HCAPLUS

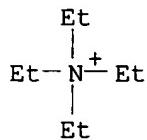
CN Ethanaminium, N,N,N-triethyl-, salt with trifluoromethanesulfonic acid (1:1) (9CI) (CA INDEX NAME)

CM 1

CRN 37181-39-8  
CMF C F3 O3 S

CM 2

CRN 66-40-0  
CMF C8 H20 N



L51 ANSWER 25 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 1991:617126 HCAPLUS  
 DN 115:217126  
 TI Controlled permeability of functionalized polypyrrole films by use of different **electrolyte** anion sizes in the electropolymerization step  
 AU Cosnier, S.; Deronzier, A.; Roland, J. F.  
 CS Lab. Electrochim. Org. Photochim. Redox, Univ. Joseph Fourier Grenoble 1, Grenoble, 38041, Fr.  
 SO Journal of Electroanalytical Chemistry and Interfacial Electrochemistry (1991), 310(1-2), 71-87  
 CODEN: JEIEBC; ISSN: 0022-0728  
 DT Journal  
 LA English  
 AB A series of electrodes modified by polypyrrole films substituted by a tris-bipyridine (e.g. (pyrrolylalkyl)methylbipyridine) ruthenium complex was prepared in CH<sub>3</sub>CN in the presence of a large variety of **electrolytes** having different anion sizes. A further exchange of the former incorporated anion with perchlorate associated with the electrochem. destruction of the conductivity of the polypyrrole backbone leads to modified electrodes exhibiting different behaviors toward the permeation of solutes like ferrocene and decamethylferrocene chosen as models. Utilization of toluenesulfonate or substituted toluenesulfonate with a long aliphatic chain as the supporting **electrolyte** in the **polymerization** media enhances markedly the permeability of the films with regard to modified electrodes prepared in a perchlorate **electrolyte**. In contrast, the incorporation of larger anions like anthraquinonesulfonate or naphthalenesulfonate increases the permeation of the films very little as a consequence of a lower ordered **polymeric** structure. The influence of other parameters such as the electropolymerization method and **crosslinking** degree of the **polymer** was also investigated.  
 CC 72-2 (Electrochemistry)  
 Section cross-reference(s): 29, 35, 36, 78  
 ST electropolymerization ruthenium pyrrolylalkylmethylbipyridine complex anion effect; permeation ferrocene ruthenium **polymeric** complex; ferrocene permeation electrooxidn **polymer** coated thalium; anthraquinonesulfonate incorporation ruthenium **polymeric** complex; naphthalenesulfonate incorporation ruthenium **polymer** complex; electrode modified polypyrrole film ruthenium complex  
 IT Permeability and Permeation  
     (of ferrocene and decamethylferrocene by ruthenium(pyrrolylalkyl)methyl bipyridine **polymeric** complex prepared in presence of various anions on platinum)  
 IT Oxidation, electrochemical  
     (of ferrocene and decamethylferrocene on platinum modified with ruthenium(pyrrolylalkyl)methylbipyridine **polymeric** complex prepared in presence of various anions, permeation in relation to)  
 IT Surface structure  
     (of platinum electrode modified with ruthenium(pyrrolylalkyl)methylbipy

ridine **polymeric** complexes prepared in acetonitrile with various anions)

IT Anion exchange  
(of ruthenium(pyrrolylalkyl)methylbipyridine **polymeric** complexes with various anions by perchlorate)

IT Electrodes  
(platinum modified with ruthenium(pyrrolylalkyl)methylbipyridine or ruthenium bipyridine(pyrrolylalkyl)methylbipyridine **polymeric** complexes)

IT **Polymerization**  
(electrochem., of ruthenium(pyrrolylalkyl)methylbipyridine and ruthenium bipyridine(pyrrolylalkyl)methylbipyridine complexes on platinum in acetonitrile containing various anions)

IT 1923-70-2  
RL: PRP (Properties)  
(electrochem. **polymerization** of ruthenium(pyrrolylalkyl)methylbipyridine complex on platinum in acetonitrile containing, permeation of ferrocene and decamethylferrocene in relation to)

IT 1330-69-4, Dodecylbenzenesulfonate anion 5776-56-7 14797-73-0,  
Perchlorate 16023-36-2 16722-51-3, p-Toluenesulfonate anion, uses and miscellaneous 37181-39-8  
RL: PRP (Properties)  
(electrochem. **polymerization** of ruthenium(pyrrolylalkyl)methylbipyridine complex on platinum in acetonitrile containing, controlled permeability in relation to)

IT 733-44-8, Tetraethylammonium p-toluenesulfonate 7182-86-7,  
Tetrabutylammonium p-toluenesulfonate  
RL: PRP (Properties)  
(electrochem. **polymerization** of ruthenium(pyrrolylalkyl)methylbipyridine complexes on platinum in acetonitrile containing)

IT 7440-06-4, Platinum, uses and miscellaneous  
RL: USES (Uses)  
(electrode, **polymerization** of ruthenium(pyrrolylalkyl)methylbipyridine and ruthenium bipyridine(pyrrolylalkyl)methylbipyridine complexes on, in acetonitrile containing various anions)

IT 102-54-5, Ferrocene 12126-50-0, Decamethylferrocene  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(permeation and oxidation of, on platinum electrode modified with ruthenium(pyrrolylalkyl)bipyridine **polymeric** complex prepared in solution with various anions)

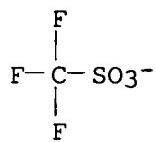
IT 136783-17-0 136783-18-1 **136783-19-2**  
RL: PRP (Properties)  
(platinum electrode modified with, permeation and oxidation of ferrocene and decamethylferrocene at, in acetonitrile)

IT 98587-97-4 136710-96-8  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(**polymerization** of, electrochem., on platinum in acetonitrile containing various anions, controlled permeability in relation to)

IT **37181-39-8**  
RL: PRP (Properties)  
(electrochem. **polymerization** of ruthenium(pyrrolylalkyl)methylbipyridine complex on platinum in acetonitrile containing, controlled permeability in relation to)

RN 37181-39-8 HCPLUS

CN Methanesulfonic acid, trifluoro-, ion(1-) (9CI) (CA INDEX NAME)



IT 136783-19-2

RL: PRP (Properties)

(platinum electrode modified with, permeation and oxidation of ferrocene and decamethylferrocene at, in acetonitrile)

RN 136783-19-2 HCPLUS

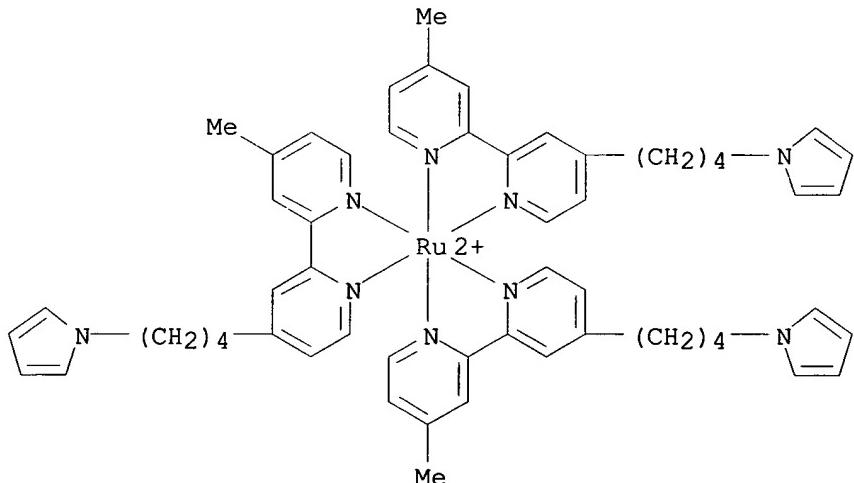
CN Ruthenium(2+), tris[4-methyl-4'-(4-(1H-pyrrol-1-yl)butyl)-2,2'-bipyridine-N1,N1']-, salt with trifluoromethanesulfonic acid (1:2), homopolymer (9CI)  
(CA INDEX NAME)

CM 1

CRN 136710-96-8

CMF C57 H63 N9 Ru

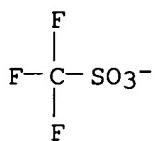
CCI CCS



CM 2

CRN 37181-39-8

CMF C F3 O3 S



AN 1991:531431 HCAPLUS  
 DN 115:131431  
 TI Preparation of surface-modified polyacrylonitrile substrates for isolation of biological material  
 IN Chang, Laurence Wu Kwang; Anderson, Larry Stanley; Ley, David Arthur  
 PA American Cyanamid Co., USA  
 SO Eur. Pat. Appl., 21 pp.  
 CODEN: EPXXDW

DT Patent

LA English

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 397119	A2	19901114	EP 1990-108667	19900508
	EP 397119	A3	19911127		
	EP 397119	B1	19950913		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE				
	US 5082904	A	19920121	US 1990-507586	19900413
	CA 2016061	AA	19901108	CA 1990-2016061	19900504
	NO 9002014	A	19901109	NO 1990-2014	19900507
	NO 176181	B	19941107		
	NO 176181	C	19950215		
	KR 167756	B1	19990320	KR 1990-6535	19900507
	JP 03095236	A2	19910419	JP 1990-117003	19900508
	JP 2970926	B2	19991102		
	ES 2076988	T3	19951116	ES 1990-108667	19900508
	US 5194512	A	19930316	US 1991-738986	19910701
	US 5284911	A	19940208	US 1992-977989	19921118
	KR 175724	B1	19990515	KR 1998-29634	19980723
	JP 2000034358	A2	20000202	JP 1999-160874	19990608
	JP 3130301	B2	20010131		
PRAI	US 1989-349569	A	19890508		
	US 1990-507586	A	19900413		
	KR 1990-6535	A	19900507		
	JP 1990-117003	A3	19900508		
	US 1991-738986	A3	19910701		

AB The title substrates comprise (a) a core of polyacrylonitrile or an acrylonitrile copolymer; and (b) a surface having evenly distributed (i) N-halo amide groups (or pendant bioactive ligands linked through N-halo amide groups) bound to the surface, and optionally, (ii) nitrile and/or amide groups. The surface-modified substrates are useful in isolation of biol. materials. Polyacrylonitrile beads bearing pendant amide groups were treated with diethyleneglycol and then with 2-fluoro-1-methylpyridinium toluene-4-sulfonate. Protein A was coupled to the product. The protein A beads bound .aprx.27.0 mg IgG/mL beads.

IC ICM C08F008-12

ICS B01J020-32; C12N011-08

CC 9-14 (Biochemical Methods)

Section cross-reference(s): 15

ST polyacrylonitrile substrate biol material isolation; biochemical immobilization acrylonitrile **polymer**; IgG isolation  
 polyacrylonitrile protein A

IT Catalysts and Catalysis

(alkaline, in preparation of acrylonitrile **polymer**-bioactive ligand conjugates)

IT Halogenation

Reducing agents

(in preparation of acrylonitrile **polymer**-bioactive ligand conjugates)

IT Peroxides, uses and miscellaneous  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(in preparation of acrylonitrile **polymer**-bioactive ligand conjugates)

IT Enzymes  
Nucleic acids  
Peptides, analysis  
Polysaccharides, analysis  
Proteins, analysis  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(isolation of, acrylonitrile **polymer**-bioactive ligand conjugates preparation for)

IT Immobilization, biochemical  
(of bioactive ligand on acrylonitrile **polymer** derivs.)

IT **Membranes**  
(porous, surface-modified acrylonitrile **polymers** for)

IT Dyes  
Pigments  
Agglutinins and Lectins  
Antibodies  
Antigens  
Antitoxins  
Haptens  
Hormones  
Toxins  
RL: ANST (Analytical study)  
(reaction products with acrylonitrile **polymer** derivs.)

IT Proteins, specific or class  
RL: ANST (Analytical study)  
(A, reaction products, with acrylonitrile **polymer** deriv. preparation of and IgG binding to)

IT Alkenes, **polymers**  
RL: ANST (Analytical study)  
(C2-6, **polymers**, with acrylonitrile, reaction products with bioactive ligands)

IT Immunoglobulins  
RL: PROC (Process)  
(G, binding of, to protein A-acrylonitrile **polymer** derivative resin)

IT Chromatography, column and liquid  
(affinity, stationary phases, biol. material isolation of, acrylonitrile **polymer** derivative-bioactive ligand conjugates for)

IT Transition metals, compounds  
RL: ANST (Analytical study)  
(complexes, reaction products with acrylonitrile **polymer** derivs.)

IT Vinyl compounds, **polymers**  
RL: ANST (Analytical study)  
(halo, **polymers**, with acrylonitrile, reaction products with bioactive ligands)

IT Nucleotides, **polymers**  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(poly-, isolation of, acrylonitrile **polymer**-bioactive ligand conjugates preparation for)

IT Nucleotides, **polymers**  
RL: ANST (Analytical study)  
(poly-, reaction products, with acrylonitrile **polymer** derivs.)

IT Albumins, compounds

RL: SPN (Synthetic preparation); PREP (Preparation)  
(reaction products, with acrylonitrile **polymer** derivative, preparation  
of, as substrate)

IT Carboxylic acids, compounds  
Enzymes  
Hydrazides  
Nucleic acids  
Peptides, compounds  
Polysaccharides, compounds  
Proteins, specific or class  
Sulfonic acids, compounds  
RL: ANST (Analytical study)  
(reaction products, with acrylonitrile **polymer** derivs.)

IT Quaternary ammonium compounds, compounds  
RL: ANST (Analytical study)  
(reaction products, with acrylonitrile **polymers**)

IT Amides, compounds  
Ligands  
Nitriles, compounds  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(reaction products, with acrylonitrile **polymers**, preparation of)

IT Amines, compounds  
RL: ANST (Analytical study)  
(tertiary, reaction products, with acrylonitrile **polymer**  
derivs.)

IT Amides, compounds  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(N-halo, reaction products with acrylonitrile **polymers**,  
preparation of)

IT 77-86-1 111-40-0, Diethylenetriamine 111-42-2, biological studies  
111-46-6, Diethylene glycol, biological studies 112-27-6, Triethylene  
glycol 6291-84-5 24991-53-5, Polyoxyethylenediamine 30140-39-7,  
Hexanediamine 56-40-6, Glycine, biological studies 56-81-5,  
1,2,3-Propanetriol, biological studies 60-32-2, 6-Aminocaproic acid  
107-15-3, Ethylenediamine, biological studies 107-21-1, 1,2-Ethanediol,  
biological studies 107-95-9,  $\beta$ -Alanine 141-43-5, Ethanolamine,  
biological studies  
RL: ANST (Analytical study)  
(as bridging group in acrylonitrile **polymer**-bioactive ligand  
conjugates)

IT 67-68-5, Dimethyl sulfoxide, biological studies 7722-84-1, Hydrogen  
peroxide, biological studies  
RL: ANST (Analytical study)  
(in preparation of acrylonitrile **polymer**-bioactive ligand  
conjugates)

IT 102-71-6DP, reaction products with **polyacrylonitrile**  
RL: RCT (Reactant); SPN (Synthetic preparation); PREP  
(Preparation); RACT (Reactant or reagent)  
(preparation and reaction of, for substrate preparation)

IT 136023-51-3DP, reaction products with **polyacrylonitrile**  
RL: RCT (Reactant); SPN (Synthetic preparation); PREP  
(Preparation); RACT (Reactant or reagent)  
(preparation and reaction of, in preparation of substrate)

IT 9007-43-6DP, Cytochrome c, reaction products with acrylonitrile  
**polymer** derivative  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(preparation of, as substrate)

IT 79-10-7DP, 2-Propenoic acid, alkyl derivs., Cl-6 hydroxyesters, bioactive  
ligands reaction products 79-41-4DP, alkyl derivs., Cl-6 hydroxyesters,

bioactive ligands reaction products 88-12-0DP, derivs., acrylonitrile copolymers, bioactive ligands reaction products 107-13-1DP, 2-Propenenitrile, **polymers**, bioactive ligands reaction products 3858-83-1DP, p-Aminobenzamidine, acrylonitrile **polymer** reaction products 9037-82-5DP, bioactive ligands reaction products 24968-79-4DP, Acrylonitrile-methyl acrylate copolymer, bioactive ligands reaction products 24980-62-9DP, Acrylonitrile-vinyl acetate copolymer, bioactive ligands reaction products 25014-41-9DP, Polyacrylonitrile, bioactive ligands reaction products 26660-38-8DP, Acrylonitrile-glycidylmethacrylate copolymer, bioactive ligands reaction products 39587-69-4DP, Acrylonitrile-glycidylacrylate copolymer, bioactive ligands reaction products 135899-16-0DP, bioactive ligands reaction products 135899-17-1DP, bioactive ligands reaction products  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(preparation of, for biol. materials isolation)

IT 100-36-7DP, N,N-Diethylethylenediamine, reaction products with polyacrylonitrile derivative 105-59-9DP, N-Methyldiethanolamine, reaction products with polyacrylonitrile derivative 124-09-4DP, 1,6-Hexanediamine, reaction products with polyacrylonitrile derivative 12236-82-7DP,  
reaction products with polyacrylonitrile derivative  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(preparation of, for substrate preparation)

IT 74124-79-1  
RL: RCT (**Reactant**); RACT (Reactant or reagent)  
(reaction of, with **acrylonitrile polymer** derivative)

IT 58086-67-2  
RL: RCT (**Reactant**); RACT (Reactant or reagent)  
(reaction of, with **polyacrylonitrile** derivative beads)

IT 12236-82-7DP, reaction products with polyacrylonitrile derivative  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(preparation of, for substrate preparation)

RN 12236-82-7 HCAPLUS

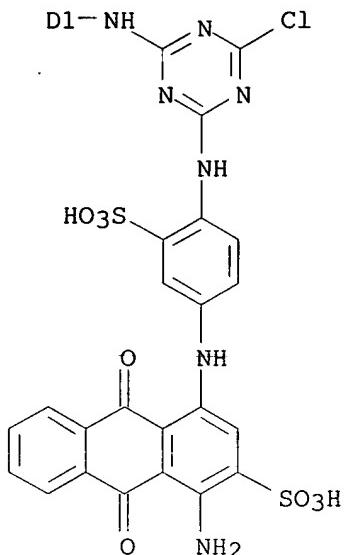
CN 2-Anthracesulfonic acid, 1-amino-4-[[4-[[4-chloro-6-[[3(or 4)-sulfophenyl]amino]-1,3,5-triazin-2-yl]amino]-3-sulfophenyl]amino]-9,10-dihydro-9,10-dioxo- (9CI) (CA INDEX NAME)

PAGE 1-A



D1-SO<sub>3</sub>H

PAGE 2-A



IT 58086-67-2

RL: RCT (Reactant); RACT (Reactant or reagent)  
(reaction of, with polyacrylonitrile derivative beads)

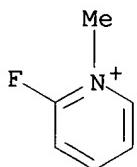
RN 58086-67-2 HCAPLUS

CN Pyridinium, 2-fluoro-1-methyl-, salt with 4-methylbenzenesulfonic acid  
(1:1) (9CI) (CA INDEX NAME)

CM 1

CRN 58086-66-1

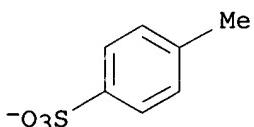
CMF C6 H7 F N



CM 2

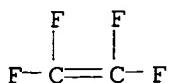
CRN 16722-51-3

CMF C7 H7 O3 S



L51 ANSWER 27 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 1982:617606 HCAPLUS  
 DN 97:217606  
 TI Ion-exchange **membranes**  
 IN Mas, Louis; Bernard, Michel; Chapiro, Adolphe; Bonamour, Anna Maria  
 PA Societe de Recherches Techniques et Industrielles S. A. (SRTI), Fr.  
 SO Fr. Demande, 11 pp.  
 CODEN: FRXXBL  
 DT Patent  
 LA French  
 FAN.CNT 1

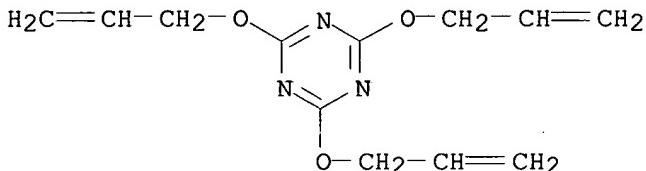
	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	FR 2494702	A1	19820528	FR 1980-24797	19801121
	FR 2494702	B1	19880304		
PRAI	FR 1980-24797		19801121		
AB	The title <b>membranes</b> , useful in electrolysis cells, are prepared from grafted, crosslinked <b>fluoropolymers</b> . Thus, a 300- $\mu$ fabric of PTFE was irradiated with 0.12 Mrad gamma rays in air and immersed in a solution of acrylic acid 47.5, ethylene glycol dimethacrylate 5, and H <sub>2</sub> O 47.5% at 60° until the degree of grafting was .apprx.10%. A <b>membrane</b> prepared from this graft <b>polymer</b> [83707-89-5] retained its mech. and elec. properties during 800 h immersion in 40% KOH at 200°.				
IC	C08J005-22; C08J007-18; C25B013-08				
ICA	C08F259-08				
CC	38-3 ( <b>Plastics</b> Fabrication and Uses) Section cross-reference(s): 72				
ST	cation exchanger <b>membrane</b> ; electrolysis cell <b>membrane</b> ; <b>fluoropolymer</b> grafted <b>membrane</b> ; PTFE grafted <b>membrane</b> ; acrylic acid graft <b>fluoropolymer</b> ; methacrylate ethylenedi graft <b>fluoropolymer</b> ; graft <b>polymer</b> cation exchanger				
IT	<b>Electrolytic</b> cells ( <b>membranes</b> for, acrylic acid-grafted PTFE as)				
IT	<b>Polymerization</b> (graft, radiochem., of acrylic compds. on PTFE)				
IT	Cation exchangers ( <b>membranes</b> , acrylic acid-grafted PTFE, for <b>electrolytic</b> cells)				
IT	83707-88-4 83707-89-5 RL: USES (Uses) (graft, cation exchange <b>membranes</b> , for <b>electrolytic</b> cells)				
IT	83707-88-4 RL: USES (Uses) (graft, cation exchange <b>membranes</b> , for <b>electrolytic</b> cells)				
RN	83707-88-4 HCAPLUS				
CN	2-Propenoic acid, polymer with tetrafluoroethene and 2,4,6-tris(2-propenoxy)-1,3,5-triazine (9CI) (CA INDEX NAME)				
CM	1				
CRN	116-14-3				
CMF	C2 F4				



CM 2

CRN 101-37-1

CMF C12 H15 N3 O3



CM 3

CRN 79-10-7

$$\text{HO}-\overset{\text{O}}{\underset{\parallel}{\text{C}}}-\text{CH}_2-\text{CH}_3$$

L51 ANSWER 28 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
AN 1981:569885 HCAPLUS  
DN 95:169885  
TI Studies on conjugated polymers. VI. Polymerization  
of benzonitrile and benzyl cyanide  
AU Liu, Yu-Cheng; Jiang, Zhi-Gin; Xue, Jin-Zheng; Pan, Jin-Rvi  
CS Lanchow Univ., Lanchow, Peop. Rep. China  
SO Lanzhou Daxue Xuebao, Ziran Kexueban (1979), (1), 98-107  
CODEN: LCTHAF; ISSN: 0455-2059  
DT Journal  
LA Chinese  
AB Polymerization of benzyl cyanide [140-29-4] with BF<sub>3</sub> or TiCl<sub>4</sub> at  
200-300° gives polyphenylacetonitrile (I) [29323-90-8].  
Cyclotrimerization of benzonitrile [100-47-0] in the  
presence of metal halides gives 2,4,6-triphenyl-s-triazine [  
493-77-6]. At 350°, BF<sub>3</sub>.C<sub>6</sub>H<sub>5</sub>OMe complex [456-31-5]  
induces the polymerization and trimerization of C<sub>6</sub>H<sub>5</sub>CN; the cyclic  
trimer then underwent ring-opening polymerization. The mechanism of  
polymerization of these 2 nitriles probably involved the intermediate  
stage of the cyclic trimer. I had elec. conductivity 10<sup>-9</sup> Ω<sup>-1</sup> cm<sup>-1</sup> and was  
semiconductive.  
CC 35-4 (Synthetic High Polymers)  
ST benzonitrile polymer catalyst boron complex; benzyl cyanide  
polymer catalyst; anisole complex polymer catalyst;  
Friedel Craft catalyst polymer; semiconductor  
polyphenylacetonitrile; ring opening polymer phenyltriazine

IT **Polymerization catalysts**  
     (anisole-boron **trifluoride** complex, for benzonitrile)

IT **Polymerization catalysts**  
     (Friedel-Crafts, for benzyl cyanide)

IT **Trimerization catalysts**  
     (cyclo-, anisole-boron **trifluoride**, for benzonitrile)

IT **Polymerization**  
     (ring-opening, of triphenyltriazine)

IT 7550-45-0, uses and miscellaneous 7637-07-2, uses and miscellaneous  
     RL: CAT (Catalyst use); USES (Uses)  
         (catalysts, for **Polymerization** of benzyl cyanide)

IT 456-31-5  
     RL: CAT (Catalyst use); USES (Uses)  
         (catalysts, for **trimerization** and **Polymerization** of  
             benzonitrile)

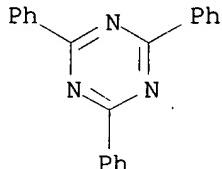
IT 100-47-0, reactions 140-29-4  
     RL: RCT (Reactant); RACT (Reactant or reagent)  
         (**Polymerization** of, mechanism of)

IT 493-77-6P 26809-03-0P 29323-90-8P  
     RL: SPN (Synthetic preparation); PREP (Preparation)  
         (preparation of, catalysts for)

IT 493-77-6P  
     RL: SPN (Synthetic preparation); PREP (Preparation)  
         (preparation of, catalysts for)

RN 493-77-6 HCAPLUS

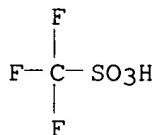
CN 1,3,5-Triazine, 2,4,6-triphenyl- (9CI) (CA INDEX NAME)



L51 ANSWER 29 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 1976:58684 HCAPLUS  
 DN 84:58684  
 TI Oligomerization of acrylonitrile  
 IN Mahan, John E.; Gardner, Lloyd E.  
 PA Phillips Petroleum Co., USA  
 SO U.S., 3 pp.  
 CODEN: USXXAM  
 DT Patent  
 LA English  
 FAN.CNT 1

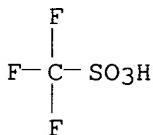
	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 3920722	A	19751118	US 1974-482255	19740624
PRAI	US 1974-482255	A	19740624		
AB	Et <sub>3</sub> N (0.058 mole) was added to a chilled mixture of (F <sub>3</sub> CSO <sub>3</sub> ) <sub>2</sub> Co 0.014 and inhibitor-free CH <sub>2</sub> :CHCN 0.76 mole and the mixture held 96 hr at 0° to give 53.3% NCCH <sub>2</sub> CH <sub>2</sub> C(:CH <sub>2</sub> )CN (I) and 10.3% CH <sub>2</sub> :C(CN)CH <sub>2</sub> CH(CN)(CH <sub>2</sub> ) <sub>2</sub> CN (II). Similar treatment using (F <sub>3</sub> CSO <sub>3</sub> ) <sub>2</sub> Zn instead of (F <sub>3</sub> CSO <sub>3</sub> ) <sub>2</sub> Co and a reaction temperature of 20° gave 57.2% I and 10.7% II.				
IC	C07C				
NCL	260465800D				

CC 23-19 (Aliphatic Compounds)  
 Section cross-reference(s): 35  
 ST acrylonitrile dimerization catalyst; **trimerization**  
**acrylonitrile** catalyst; methyleneglutaronitrile; glutaronitrile  
 methylene; hexenetricarbonitrile  
 IT 54010-75-2 58164-61-7  
 RL: CAT (Catalyst use); USES (Uses)  
 (catalyst from triethylamine and, for oligomerization of acrylonitrile)  
 IT 54010-75-2 58164-61-7  
 RL: CAT (Catalyst use); USES (Uses)  
 (catalyst from triethylamine and, for oligomerization of acrylonitrile)  
 RN 54010-75-2 HCPLUS  
 CN Methanesulfonic acid, trifluoro-, zinc salt (9CI) (CA INDEX NAME)



●1/2 Zn

RN 58164-61-7 HCPLUS  
 CN Methanesulfonic acid, trifluoro-, cobalt(2+) salt (9CI) (CA INDEX NAME)



●1/2 Co(II)

L51 ANSWER 30 OF 37 HCPLUS COPYRIGHT 2005 ACS on STN  
 AN 1973:419743 HCPLUS

DN 79:19743

TI Triazines and crosslinked **polymers** or copolymers

IN Emerson, William E.; Dorfman, Edwin

PA Hooker Chemical Corp.

SO U.S., 9 pp.

CODEN: USXXAM

DT Patent

LA English

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 3728344	A	19730417	US 1970-38651	19700522
	GB 1229054	A	19710421	GB 1968-1229054	19680417
	BE 714465	A	19681030	BE 1968-714465	19680430
PRAI	US 1967-634877	A	19670501		

2

AB Triazines were prepared from **perfluoroalkanonitriles** in high yields at low temps, and **polymers** containing >1 **cyanofluoroalkyl** group/mol. were crosslinked using amine oxides, their hydrochlorides or organometallic compds. as catalysts. Thus, a mixture of 3.56 parts **perfluoroctanonitrile** (I) [647-12-1] and 0.384 parts triphenyltin [892-20-6] was heated 20 hr at 160.deg. to give 100% tris(**perfluoroheptyl**)triazine (I) [21674-38-4]. I and 5% phenazine N-oxide [304-81-4] heated 20 hr at 190.deg. gave 100% II. A **perfluoroalkyltriazine polymer** containing 1-20 **cyanoperfluoropropyl** groups per 99-80 **perfluoropropyl** groups, resp., was mixed with .sim.5 weight % copper acetylacetone [13395-16-9] and heated 97 hr at 150.deg. to form a crosslinked **polymer** insol. in hexane. Trimethylamine oxide hydrochloride [7651-88-9] (5%) gave the crosslinked **polymer** in 263 hr at 100.deg..

IC C07D

NCL 260248000CS

CC 36-6 (Plastics Manufacture and Processing)

ST **perfluoroctanonitrile trimerization catalyst;**  
**fluoroheptyltriazine polymer** crosslinking catalyst; tin organo trimerization catalyst; phenazine oxide trimerization catalyst; copper triazine crosslinking catalyst; amine oxide hydrochloride catalyst

IT Organometallic compounds  
RL: CAT (Catalyst use); USES (Uses)  
(catalysts, for **trimerization of**  
**perfluoroctanenitrile**)

IT Crosslinking catalysts  
(organometallic compds., for **perfluoroalkyltriazine** derivative **polymers**)

IT Trimerization catalysts  
(organometallic compds., for **perfluoroctanenitrile**)

IT 102-54-5 587-85-9 2155-73-9 4253-22-9 6752-41-6 7330-43-0  
7529-22-8 7651-88-9 12084-29-6  
RL: CAT (Catalyst use); USES (Uses)  
(catalysts, for crosslinking of **perfluoroalkyltriazine** derivative **polymers**)

IT 76-87-9 595-89-1 595-90-4 999-97-3 1112-56-7 3958-19-8  
10210-68-1 12154-95-9 13395-16-9 15435-71-9 16091-18-2  
17499-48-8  
RL: CAT (Catalyst use); USES (Uses)  
(catalysts, for **trimerization of**  
**perfluoroctanenitrile**)

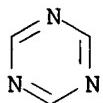
IT 290-87-9D, 1,3,5-Triazine, **perfluoroalkyl** derivs.,  
**polymers**  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(crosslinking of, catalysts for)

IT 21674-38-4P  
RL: PEP (Physical, engineering or chemical process); PREP (Preparation);  
PROC (Process)  
(manufacture of, catalysts for)

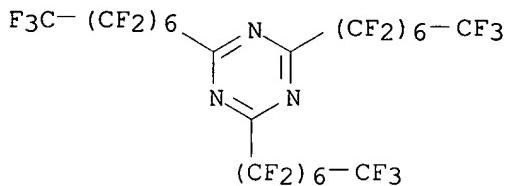
IT 290-87-9D, 1,3,5-Triazine, **perfluoroalkyl** derivs.,  
**polymers**  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(crosslinking of, catalysts for)

RN 290-87-9 HCPLUS

CN 1,3,5-Triazine (9CI) (CA INDEX NAME)



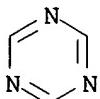
IT **21674-38-4P**  
 RL: PEP (Physical, engineering or chemical process); PREP (Preparation);  
 PROC (Process)  
 (manufacture of, catalysts for)  
 RN 21674-38-4 HCAPLUS  
 CN 1,3,5-Triazine, 2,4,6-tris(pentadecafluoroheptyl)- (9CI) (CA INDEX NAME)



L51 ANSWER 31 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 1970:67772 HCAPLUS  
 DN 72:67772  
 TI Catalytic conversion of haloalkane nitriles to triazines and its application in the crosslinking of **polymers** or copolymers containing cyanoalkyl groups  
 IN Emerson, William E.; Dorfman, Edwin  
 PA Hooker Chemical Corp.  
 SO Fr., 23 pp.  
 CODEN: FRXXAK  
 DT Patent  
 LA French  
 FAN.CNT 2

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI FR 1574807	A	19690718	FR 1968-1574807	19680429
GB 1229054	A	19710421	GB 1968-1229054	19680417
BE 714465	A	19681030	BE 1968-714465	19680430
PRAI US 1967-634877	A	19670501		
AB	Triazines are prepared in improved yields by treating a perhaloalkane nitrile with a catalyst consisting of an organic amine oxide, an organometallic compound containing $\geq 1$ metal-C bond, or a metal $\beta$ -keto enolate. Thus, 3.56 parts <b>perfluoroctanonitrile</b> (I) was treated with 5 moles % dibutyltin distearate for 20 hr at 190° to give 100% tris( <b>perfluoroheptyl</b> )triazine (II), 53% conversion. II was similarly prepared from I by using e.g. Ph <sub>4</sub> Pb, cupric acetylacetone (III), phenazine N-oxide, Mn(CO) <sub>5</sub> , hexamethyldisilazane, or ferrocenes. A <b>perfluoroalkylenetriazine polymer</b> containing 1-20% <b>cyanoperfluoropropyl</b> groups and 99-80% <b>perfluoropropyl</b> groups, resp., was heated 97 hr at 150° with 5% III to give a crosslinked <b>polymer</b> insol. in <b>hexafluoroxylene</b> . The post curing of the <b>polymer</b> improved its tensile strength.			
IC	C07D; C08F			

CC 36 (**Plastics Manufacture and Processing**)  
ST triazines haloalkane nitriles; nitriles triazines haloalkane; haloalkane  
nitriles triazines; crosslinking **cyanoperfluoroalkyl polymers**  
**cyanoperfluoroalkyl polymers**  
crosslinking; organotin catalysts crosslinking  
IT **Polymers**, reactions  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(**cyanofluoroalkyl** group-containing, crosslinking of)  
IT Crosslinking catalysts  
(for **cyanofluoroalkyl** group-containing **polymers**)  
IT **Trimerization** catalysts  
(for **perfluoroalkyl nitriles**)  
IT Ring closure  
(in **trimerization of perfluoroalkyl nitriles**)  
IT Crosslinking  
(of **cyanofluoroalkyl** group-containing **polymers**)  
IT Carbonyls  
RL: USES (Uses)  
(transition metal, catalysts, for **trimerization of perfluoroalkyl nitriles**)  
IT Mercury, dichloro- $\mu$ -1,1'-ferrocenyldiyldi-  
RL: CAT (Catalyst use); USES (Uses)  
(catalysts, for **cyclotrimerization of perfluoroalkyl nitriles**)  
IT 76-87-9 78-50-2 79-10-7D, Acrylic acid, tributylstannyl derivative  
102-54-5 123-54-6D, 2,4-Pentanedione, metal complexes 304-81-4  
563-25-7 595-89-1 597-64-8 688-73-3 994-31-0 999-97-3  
1112-56-7 1271-19-8 1271-55-2 1273-75-2 1291-32-3 1461-22-9  
3958-19-8 5847-55-2 10170-69-1 10210-68-1 12084-29-6 12154-95-9,  
Iron, di- $\mu$ -carbonyldicarbonyldi- $\pi$ -cyclopentadienyldi-, (Fe-Fe)  
13007-92-6 13331-52-7 13395-16-9 13939-06-5 14040-11-0  
15435-71-9 16091-18-2 17499-48-8 20644-87-5, Vanadium carbonyl  
RL: CAT (Catalyst use); USES (Uses)  
(catalysts, for **cyclotrimerization of perfluoroalkyl nitriles**)  
IT **290-87-9D**, s-Triazine, derivs., **polymers**  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(crosslinking of, catalysts for)  
IT **21674-38-4P 290-87-9D**, s-Triazine, derivs.  
RL: PEP (Physical, engineering or chemical process); PREP (Preparation);  
PROC (Process)  
(manufacture of, catalysts for)  
IT **290-87-9D**, s-Triazine, derivs., **polymers**  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(crosslinking of, catalysts for)  
RN 290-87-9 HCPLUS  
CN 1,3,5-Triazine (9CI) (CA INDEX NAME)

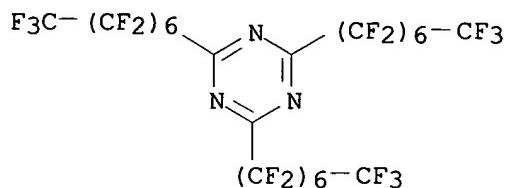


IT **21674-38-4P 290-87-9D**, s-Triazine, derivs.  
RL: PEP (Physical, engineering or chemical process); PREP (Preparation);  
PROC (Process)

(manufacture of, catalysts for)

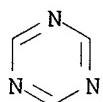
RN 21674-38-4 HCAPLUS

CN 1,3,5-Triazine, 2,4,6-tris(pentadecafluoroheptyl)- (9CI) (CA INDEX NAME)



RN 290-87-9 HCAPLUS

CN 1,3,5-Triazine (9CI) (CA INDEX NAME)



L51 ANSWER 32 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN

AN 1970:13456 HCAPLUS

DN 72:13456

TI Triazines and crosslinked **polymers** or copolymers

IN Emerson, William E.; Dorfman, Edwin

PA Hooker Chemical Corp.

SO Fr., 15 pp.

CODEN: FRXXAK

DT Patent

LA French

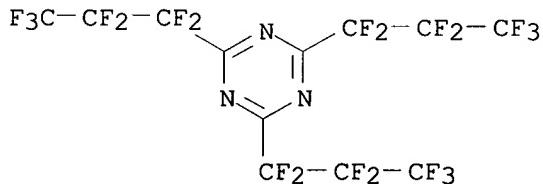
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	FR 1566876		19690509		
	GB 1229055			GB	
	US 3637629		19720000	US	
	US 3637630		19720000	US	
PRAI	US		19670501		

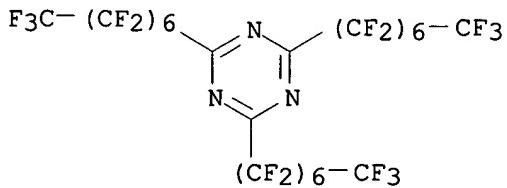
AB Triazines or crosslinked **polymers** or copolymers are prepared with high degree of conversion and high yield at low reaction temperature in the presence of at least 0.01% Ag salt, Group I, IIB, III, IV, VB, VI, VII, or VIII **fluoride**, NH<sub>4</sub>F, and (or) their hydrates. Triazines are obtained by reacting at least 1 haloalkanenitrile with the catalyst at 70-200°. The hardened crosslinked **polymer** or copolymer is prepared by reacting at least 1 **polymer** or copolymer containing several nitrile groups/mol. with the catalyst at .apprx.190°. A composition containing the crosslinked **polymer** or copolymer and a charge, e.g., of carbon black, poly(tetrafluoroethylene), and (or) Mg silicate, is used as a stopping agent. Thus, 3.74 g **perfluoroctanonitrile** and 0.134 g AgCN were heated in a sealed Carius tube under N at 190° for 22.5 hr to give 3.2% tris(**perfluoroheptyl**)triazine. Other catalysts used were AgI, AgIO<sub>3</sub>, AgNO<sub>3</sub>, AgCl, AgF, SnF<sub>2</sub>, CdF<sub>2</sub>, TiF, CoF<sub>2</sub>, TaF<sub>5</sub>, FeF<sub>2</sub>, GaF<sub>3</sub>, VaF<sub>4</sub>, NbF<sub>5</sub>, CuF<sub>2</sub>, ZnF<sub>2</sub>.4H<sub>2</sub>O, NaF<sub>2</sub>, NH<sub>4</sub>BF<sub>4</sub>, AgBF<sub>4</sub>, KF<sub>2</sub>, NiF<sub>2</sub>, SnF<sub>4</sub>, ZrF<sub>4</sub>, MnF<sub>2</sub>, FeF<sub>3</sub>.

CrF<sub>2</sub>, KF, NaF, LiF, and AlF<sub>3</sub>.3H<sub>2</sub>O. Also prepared was tris(**perfluoropropyl**)triazine from **perfluorobutyronitrile**.

IC C07D; C08F  
 CC 36 (**Plastics** Manufacture and Processing)  
 ST crosslinked **cyanoperfluoroalkyl polymers**;  
**cyanoperfluoroalkyl polymers** crosslinked;  
**perfluoroalkyl triazines**; **triazines perfluoroalkyl**;  
**perfluoroalkanonitriles polymn**; catalysts **polymn**  
**fluoro nitriles**; **nitriles catalysts polymn**  
**fluoro; fluoro nitriles catalysts polymn**  
 IT **Trimerization catalysts**  
     (metal **fluorides**, for **perfluoroctenonitrile**)  
 IT 506-64-9 1333-83-1 7681-49-4, uses and miscellaneous 7761-88-8, uses  
     and miscellaneous 7775-41-9 7782-64-1 7783-47-3 7783-50-8  
     7783-51-9 7783-62-2 7783-64-4 7783-68-8 7783-71-3 7783-90-6  
     7783-96-2 7783-97-3 7789-19-7 7789-23-3 7789-24-4, uses and  
     miscellaneous 7789-27-7 7789-28-8 7789-29-9 7790-79-6 10026-17-2  
     10028-18-9 10049-10-2 10049-16-8 13826-83-0 13986-18-0  
     14104-20-2 15098-87-0  
     RL: CAT (Catalyst use); USES (Uses)  
         (catalysts, for **trimerization of**  
         **perfluoroctanomitrile**)  
 IT 915-76-4P 21674-38-4P  
     RL: PREP (Preparation)  
         (manufacture of, metal catalysts for)  
 IT 915-76-4P 21674-38-4P  
     RL: PREP (Preparation)  
         (manufacture of, metal catalysts for)  
 RN 915-76-4 HCPLUS  
 CN 1,3,5-Triazine, 2,4,6-tris(heptafluoropropyl)- (9CI) (CA INDEX NAME)



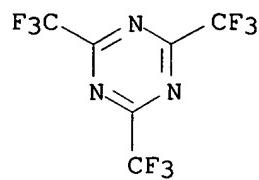
RN 21674-38-4 HCPLUS  
 CN 1,3,5-Triazine, 2,4,6-tris(pentadecafluoroheptyl)- (9CI) (CA INDEX NAME)



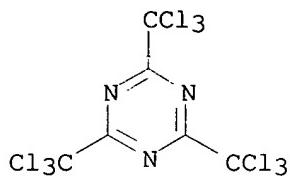
L51 ANSWER 33 OF 37 HCPLUS COPYRIGHT 2005 ACS on STN  
 AN 1969:524513 HCPLUS  
 DN 71:124513  
 TI Catalyzed nitrile trimerization

IN Zollinger, Joseph L.  
 PA Minnesota Mining and Manufacturing Co.  
 SO U.S., 9 pp.  
 CODEN: USXXAM  
 DT Patent  
 LA English  
 FAN.CNT 1

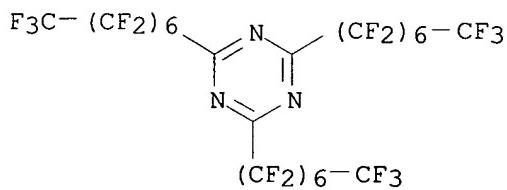
	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 3470176	A	19690930	US 1967-622038	19670310
PRAI	US 1967-622038	A	19670310		
AB	Organometallic catalysts with the formula R <sub>2</sub> R <sub>1</sub> MO or R <sub>3</sub> M(OR <sub>1</sub> ) <sub>n</sub> (M = As, Sb, or Sn) are used under anhydrous conditions in the <b>trimerization</b> of <b>nitriles</b> or <b>polynitriles</b> to form s-triazines or triazine-linked <b>polymers</b> , resp. Thus, a 95% solution of Bu <sub>3</sub> SbBr <sub>2</sub> was passed through the OH form of an anion-exchange resin and the solution was concentrated to give Bu <sub>3</sub> Sb(OH) <sub>2</sub> (I). A mixture of 20 g. C <sub>5</sub> F <sub>11</sub> CN (b. 53°) and 0.4 g. I was shaken in a stoppered flask at 23° for 24 hrs. and the mixture was distilled to give 85% 2,4,6-tris( <b>perfluoropentyl</b> )-s-triazine, b <sub>38</sub> 151-2°, n <sub>23D</sub> 1.3160, d <sub>204</sub> 1.800. The preparation of similar <b>fluorinated-alkyl</b> -substituted s-triazines is described. NC(CF <sub>2</sub> ) <sub>8</sub> CN, O(CF <sub>2</sub> CF <sub>2</sub> CN) <sub>2</sub> , NCCF <sub>2</sub> CF <sub>2</sub> O(CF <sub>2</sub> ) <sub>4</sub> OCF <sub>2</sub> CF <sub>2</sub> CN, NC(CF <sub>2</sub> CF <sub>2</sub> OCF <sub>2</sub> CF <sub>2</sub> ) <sub>4</sub> CN, and C <sub>2</sub> F <sub>5</sub> OCF <sub>2</sub> CF <sub>2</sub> CN were used in the preparation of crosslinked transparent gels, resilient elastomers, and triazine rubber.				
IC	C07D				
NCL	260248000				
CC	28 (Heterocyclic Compounds (More Than One Hetero Atom))				
ST	<b>nitriles trimerization; trimerization</b> <b>nitriles; catalysts nitrile trimerization;</b> <b>triazines; fluorine contg triazines; polymeric</b> <b>triazines; organometallic catalysts</b>				
IT	<b>Nitriles</b> , reactions RL: RCT (Reactant); RACT (Reactant or reagent) ( <b>perfluoro</b> aliphatic, <b>cyclotrimerization</b> of)				
IT	<b>Trimerization catalysts</b> (tributylidihydroxyantimony and tributylstibine oxide, for <b>cyclotrimerization</b> of <b>perfluoro</b> aliphatic <b>nitriles</b> )				
IT	6752-41-6	23790-48-9			
	RL: CAT (Catalyst use); USES (Uses)				
	(catalysts, for <b>cyclotrimerization</b> of <b>perfluoro</b> aliphatic <b>nitriles</b> )				
IT	<b>368-66-1P 6542-67-2P 21674-38-4P</b> <b>23790-50-3P 24142-25-4P 25240-03-3P</b> <b>25302-65-2P 25325-51-3P 25455-82-7P</b>				
	RL: SPN (Synthetic preparation); PREP (Preparation)				
	(preparation of)				
IT	<b>368-66-1P 6542-67-2P 21674-38-4P</b> <b>23790-50-3P 24142-25-4P 25240-03-3P</b> <b>25325-51-3P 25455-82-7P</b>				
	RL: SPN (Synthetic preparation); PREP (Preparation)				
	(preparation of)				
RN	368-66-1 HCPLUS				
CN	1,3,5-Triazine, 2,4,6-tris(trifluoromethyl)- (9CI) (CA INDEX NAME)				



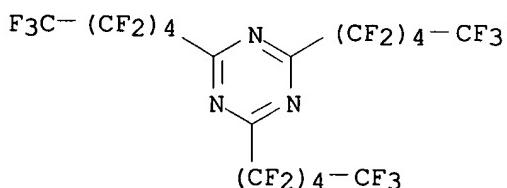
RN 6542-67-2 HCPLUS  
CN 1,3,5-Triazine, 2,4,6-tris(trichloromethyl)- (9CI) (CA INDEX NAME)



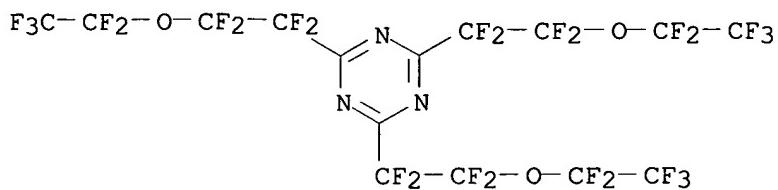
RN 21674-38-4 HCPLUS  
CN 1,3,5-Triazine, 2,4,6-tris(pentadecafluoroheptyl)- (9CI) (CA INDEX NAME)



RN 23790-50-3 HCPLUS  
CN s-Triazine, 2,4,6-tris(undecafluoropentyl)- (8CI) (CA INDEX NAME)

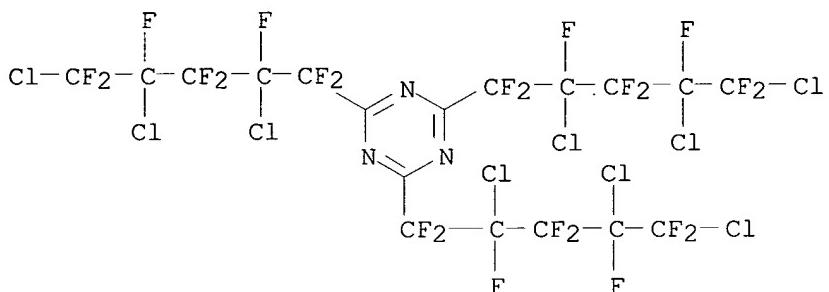


RN 24142-25-4 HCPLUS  
CN s-Triazine, 2,4,6-tris[tetrafluoro-2-(pentafluoroethoxy)ethyl]- (8CI) (CA INDEX NAME)



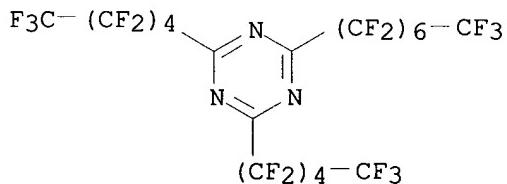
RN 25240-03-3 HCPLUS

CN 1,3,5-Triazine, 2,4,6-tris(2,4,5-trichloro-1,1,2,3,3,4,5,5-octafluoropentyl)- (9CI) (CA INDEX NAME)



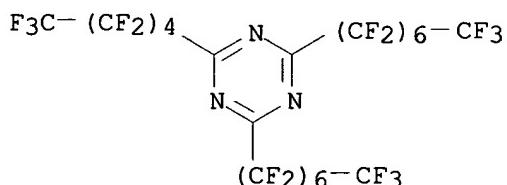
RN 25325-51-3 HCPLUS

CN s-Triazine, 2-(pentadecafluoroheptyl)-4,6-bis(undecafluoropentyl)- (8CI) (CA INDEX NAME)



RN 25455-82-7 HCPLUS

CN s-Triazine, 2,4-bis(pentadecafluoroheptyl)-6-(undecafluoropentyl)- (8CI) (CA INDEX NAME)



L51 ANSWER 34 OF 37 HCPLUS COPYRIGHT 2005 ACS on STN  
AN 1969:449988 HCPLUS

KATHLEEN FULLER EIC 1700 REMSEN 4B28 571/272-2505

DN 71:49988  
 TI Catalytic preparation of triazines and polymers of nitriles  
 IN Emerson, William E.; Dorfman, Edwin  
 PA Hooker Chemical Corp.  
 SO Fr., 6 pp.  
 CODEN: FRXXAK  
 DT Patent  
 LA French  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	FR 1554658	A	19690124	FR 1967-116758	19670803
	NL 155569	B	19780116	NL 1967-10727	19670803
	NL 7711161	A	19780228	NL 1977-11161	19771011

PRAI US 1966-570183 A 19660804

AB Thermally stable triazines and nitrile polymers useful as lubricants, solvents, and in the preparation of molded articles are prepared by condensing a nitrile in the presence of metallic oxides. Thus, 130 parts perfluorobutyronitrile was heated under N in an autoclave in the presence of 1 part Ag<sub>2</sub>O at 70° and 8 kg./cm.<sup>2</sup> for 24 hrs., heated 6 days at 80° and 7.3 kg./cm.<sup>2</sup>, the pressure released to 1.4 kg./cm.<sup>2</sup>, the mixture cooled, the pressure lowered to 0 atmospheric, and 128 parts

2,4,6-tris(perfluoropropyl)-s-triazine distilled at 42-5°/1 mm. Other catalysts used were As<sub>2</sub>O<sub>3</sub>, Bi<sub>2</sub>O<sub>3</sub>, CaO, CdO, Co<sub>2</sub>O<sub>3</sub>, CuO, Fe<sub>2</sub>O<sub>3</sub>, HgO, PbO, PbO<sub>2</sub>, Pb<sub>3</sub>O<sub>4</sub>, BaO, Sb<sub>2</sub>O<sub>3</sub>, Sb<sub>2</sub>O<sub>5</sub>, TiO<sub>2</sub>, Ti<sub>2</sub>O<sub>3</sub>, Y<sub>2</sub>O<sub>3</sub>, ZnO, and Mn<sub>3</sub>O<sub>4</sub>. Similarly perfluoroglutaronitrile was condensed to give a product m. 159° with intrinsic viscosity 0.03 dl./g. (1,2-dimethoxyethylene). Other nitriles used were perfluoro-octanonitrile, HCF<sub>2</sub>CN, ClCF<sub>2</sub>CN, PhCN perfluorosuccino-nitrile, CF<sub>3</sub>CN, CF<sub>3</sub>CF<sub>2</sub>CN, perfluoromalonitrile, bromotetra-fluoropropionitrile, bromooctafluorovaleronitrile, nonafluoro-3-thiabutyronitrile(?), perfluoroethyladiponitrile, perfluorovalero-nitrile, 4-bromoperfluorobutyronitrile, perfluorosuberonitrile, perfluorosebaconitrile, perfluoroadiponitrile, perfluorotetradecanodinitrile, perfluoromethoxypropionitrile, or perfluoroethoxy-propionitrile.

IC C07D  
 CC 28 (Heterocyclic Compounds (More Than One Hetero Atom))

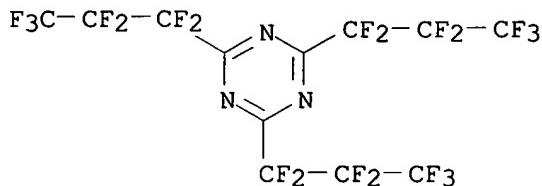
ST nitriles trimerization; trimerization  
 nitriles; fluoronitriles trimerization;  
 triazines prep; polymn dinitriles

IT 915-76-4P  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (preparation of)

IT 915-76-4P  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (preparation of)

RN 915-76-4 HCPLUS

CN 1,3,5-Triazine, 2,4,6-tris(heptafluoropropyl)- (9CI) (CA INDEX NAME)



L51 ANSWER 35 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 1968:40654 HCAPLUS  
 DN 68:40654  
 TI Use of **polymers** in current sources.  
 AU Toroptseva, T. N.  
 SO Elektrotehnika (1967), (8), 8-10  
 CODEN: ELKTAQ; ISSN: 0013-5860  
 DT Journal  
 LA Russian  
 AB Use of **polymers** as construction materials in storage battery cases, **membranes** and matrixes in the **electrolyte** containing devices, **polymeric electrolytes**, and insulation, sealing, and protective materials in current sources was discussed. Chemical resistance of polyethylene, polypropylene, **polyfluorocarbons**, polyisobutylene, acrylonitrile-styrene copolymers in acidic and alkaline **electrolytes**, of polyamide 68, melamine-formaldehyde molding material, and epoxide resin sealing composition in alkaline **electrolyte**, and of glass-reinforced material AG-4 and polycarbonate in acidic **electrolyte** was studied. For Ag-Zn alkaline batteries, regenerated cellulose **membrane** separators were used and effect of the **membrane** structure on the chemical and mech. properties was determined  
 CC 37 (**Plastics** Fabrication and Uses)  
 ST BATTERY STORAGE **POLYMER** CASES; STORAGE BATTERY **POLYMER** CASES; **POLYMER** STORAGE BATTERY CASES  
 IT Resins, epoxy, uses and miscellaneous  
 RL: USES (Uses)  
 (battery containers from, **electrolyte** resistance of)  
 IT Batteries, secondary  
 (plastic containers and separators for)  
 IT **Fluorocarbons**  
 RL: USES (Uses)  
 (**polymers**, battery containers from, **electrolyte** resistance of)  
 IT AG 4  
 RL: USES (Uses)  
 (battery containers from, **electrolyte** resistance of)  
 IT 9002-88-4, uses and miscellaneous 9003-08-1 9003-27-4, uses and miscellaneous 9003-54-7, uses and miscellaneous  
 RL: USES (Uses)  
 (battery containers from, **electrolyte** resistance of)  
 IT 463-79-6, Carbonic acid  
 RL: USES (Uses)  
 (polyesters, battery containers from, **electrolyte** resistance of)  
 IT 9003-08-1  
 RL: USES (Uses)  
 (battery containers from, **electrolyte** resistance of)

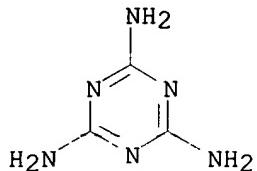
RN 9003-08-1 HCPLUS

CN 1,3,5-Triazine-2,4,6-triamine, polymer with formaldehyde (9CI) (CA INDEX NAME)

CM 1

CRN 108-78-1

CMF C3 H6 N6



CM 2

CRN 50-00-0

CMF C H2 O

H<sub>2</sub>C=O

L51 ANSWER 36 OF 37 HCPLUS COPYRIGHT 2005 ACS on STN

AN 1967:422455 HCPLUS

DN 67:22455

TI Polymers having recurring triazine rings

IN Fritz, Charles G.; Warnell, Joseph L.

PA du Pont de Nemours, E. I., and Co.

SO U.S., 7 pp.

CODEN: USXXAM

DT Patent

LA English

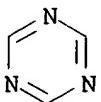
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 3317484		19670502	US	19621123

AB Perfluoroether dinitriles were synthesized and homopolymd. or copolymd. with each other. Polymerization occurred by trimerization of the nitrile groups to form triazine rings. Thus, a slurry of 6 g. CsF, 60 ml. MeCN, and 28 ml. perfluoroglutaryl fluoride was heated to 40° and hexafluoropropylene oxide was pressured in at 5 psig. After 0.25 mole of the oxide had been absorbed, the heavy fluorocarbon layer was removed and distilled in an anhydrous atmospheric to yield perfluoro-2-methyl-3-oxasuberoyl fluoride (I), b. 101°. I was cooled to 0° in a polyethylene container, an excess of MeOH was added, and the mixture was poured into ice water to sep. the di-Me ester of I. A stream of NH<sub>3</sub> was passed into a solution of 300 g. of the ester in 500 ml. Et<sub>2</sub>O at 0°, and after 4 hrs. the Et<sub>2</sub>O was evaporated to yield perfluoro-2-methyl-3-oxasuberamide (II), m. 145-7°. II was dried over P2O<sub>5</sub> and then 120 g. was mixed with 900 g. P2O<sub>5</sub>, and heated at 190-200° for 3 hrs. The mixture was distilled to yield pure

**perfluoro-2,7-dicyano-3-oxaheptane**, b. 100°.  
**Perfluoro-2,4-dicyano-3-oxabutane**, **perfluoro-2,7-dicyano-3,6-dioxaoctane (III)**, **perfluoro-2,10-dicyano-3,9-dioxaundecane**, NCCF<sub>2</sub>O(CF<sub>2</sub>CF<sub>2</sub>O)<sub>n</sub>(CF<sub>2</sub>)<sub>5</sub>(OCF<sub>2</sub>CF<sub>2</sub>)<sub>m</sub>OCF<sub>2</sub>CN where m + n = an average of 2 or 6, and NC(CF<sub>2</sub>)<sub>4</sub>(OCF<sub>2</sub>CF<sub>2</sub>)<sub>p</sub>OCF<sub>2</sub>CN where p = an average of 3 or 7, were similarly prepared Diamidines of the compds. were prepared by cooling the dinitrile in a tube to -40° and adding an excess of NH<sub>3</sub>. After 2 hrs., a diamidine had formed and the tube was cooled, evacuated, and sealed. The diamidine of III 1.5, III 8.5, and **perfluorosuccinonitrile** were mixed in a tube cooled to liquid N temperature, evacuated, and sealed. After heating for 18 hrs. at 145° and 2 hrs. at 190°, the tube was opened and the viscous prepolymer was cured in a mold by exposure to the air at 200° for 24 hrs. A hard thermoset resin casting was obtained. Similar copolymers were prepared with **perfluoroglutaronitrile**, **perfluoroadiponitrile**, or **perfluorosuberonitrile**.

NCL 260078400  
 CC 36 (Plastics Manufacture and Processing)  
 ST PERFLUORO ETHERS DICYANO POLYMN; ETHERS DICYANO PERFLUORO POLYMN; TRIAZINE POLYMERS; FLUOROPOLYMERS TRIAZINES; POLYMN DICYANO PERFLUORO ETHERS; DICYANO PERFLUORO ETHERS POLYMN  
 IT Perfluoro compounds  
 RL: PREP (Preparation)  
 (ether dinitriles, preparation and polymers with s-triazine structure from)  
 IT Plastics  
 RL: USES (Uses)  
 (from perfluoroether dinitrile polymers with recurring s-triazine rings)  
 IT Nitriles, polymers  
 RL: USES (Uses)  
 (with s-triazine rings, from perfluoroether dinitriles)  
 IT 15721-03-6 15721-04-7 15742-63-9 16835-47-5  
 RL: USES (Uses)  
 (polymers with amidines of perfluoro dinitriles, s-triazine ring-containing)  
 IT 376-53-4 376-89-6 663-41-2 3885-85-6  
 RL: USES (Uses)  
 (polymers with amidines of perfluoro ether dinitriles, s-triazine ring-containing)  
 IT 290-87-9D, s-Triazine, derivs.  
 RL: USES (Uses)  
 (polymers, from perfluoro dinitriles and perfluoroether dinitriles)  
 IT 290-87-9D, s-Triazine, derivs.  
 RL: USES (Uses)  
 (polymers, from perfluoro dinitriles and perfluoroether dinitriles)  
 RN 290-87-9 HCPLUS  
 CN 1,3,5-Triazine (9CI) (CA INDEX NAME)

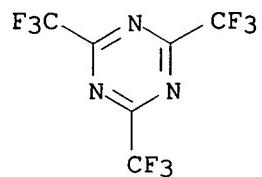


L51 ANSWER 37 OF 37 HCAPLUS COPYRIGHT 2005 ACS on STN  
 AN 1960:28787 HCAPLUS  
 DN 54:28787  
 OREF 54:5687a-d  
 TI Fluorine-containing nitrogen compounds. II.  
**Trimerization of trifluoroacetonitrile**  
 AU Bissell, Eugene R.; Spengler, Robert E.  
 CS Ernest O. Lawrence Radiation Lab., Livermore, CA  
 SO Journal of Organic Chemistry (1959), 24, 1147-8  
 CODEN: JOCEAH; ISSN: 0022-3263  
 DT Journal  
 LA Unavailable  
 OS CASREACT 54:28787  
 AB The use of hydrogen chloride as a catalyst in the **trimerization** of **trichloroacetonitrile** (I) to **2,4,6-tris(trifluoromethyl)-1,3,5-triazine** (II) was found to give yields in excess of 90% based on the unrecovered nitrile. BF<sub>3</sub> was ineffective at low temps. It was prepared by dehydration of **trifluoroacetamide**. Trimerizations were effected in a bomb. The reactants were measured as gases in a calibrated bulb with a pressure gage. They were condensed in an outgassed bomb by means of liquid N<sub>2</sub>. The bomb was allowed to warm to room temperature and kept at the specific temperature for 18-20 hrs.; temps. between 100° and 150° were maintained. The bomb was cooled, and reconnected to the vacuum manifold, the contents pumped slowly through 2-traps, the first at -78° and the 2nd at -196°. The amount in the 2nd trap was measured gasometrically. Infrared analysis showed it to consist mainly of HCl with varying amounts of unreacted I. The material from the -78° trap was distilled in vacuo and found to contain trimer contaminated by a little HCl. A typical sample of II had n<sub>25D</sub> 1.32208, d<sub>23.5</sub> 1.595. The following results were obtained (millimoles of I and of HCl, ratio, temperature, recovery millimoles gas, liquid, % recovery, and % yield given): 32.35, 8.1, 4.0, room temperature between 10-30°, 11.6, 26.9, 95.3, 83.3; 32.41, 8.1, 4.0, 100°, -, 15.0, -, 46.3; 31.81, 7.7, 4.1, 100°, 26.5, 11.8, 97.0, 37.0; 32.08, 6.3, 5.1, 150°, 32.5, 5.3, 98.3, 16.4; 32.58, 6.4, 5.1, 150°, 32.9, 4.5, 96.1, 13.9; 31.9, 15.7, 2.0, 10-30°, 16.0, 25.6, 87.4, 80.0; 32.4, 16.2, 2.0, 100°, 22.9, 21.9, 92.1, 67.6; 32.1, 32.2, 1.0, 10 30°, 20.3, 30.2, 78.7, 94.1; 32.9, 32.2, 1.0, 100°, -, 28.2, -, 85.7; 31.7, 32.7, 1.0, 125°, 36.7, 23.8, 94.8, 75.0; 33.0, 32.7, 1.0, 150°, 37.1, 24.7, 94.1, 74.9; 32.7, 32.1, 1.0, 10-30°, 33.1, 18.8, 80.2, 57.7.  
 CC 10G (Organic Chemistry: Heterocyclic Compounds)  
 IT Catalysts  
     (in **trimerization of trifluoroacetonitrile**, HCl as)  
 IT Polymerization  
     (**trimerization**, of **trifluoroacetonitrile**)  
 IT 7647-01-0, Hydrochloric acid  
     (catalysts, in **trimerization of trifluoroacetonitrile**)  
 IT 7782-41-4, Fluorine  
     (compounds, nitrogen-containing)  
 IT 368-66-1, s-Triazine, 2,4,6-tris(**trifluoromethyl**)-186958-04-3, Nitrogen, compound with fluorine  
     (preparation of)  
 IT 353-85-5, Acetonitrile, trifluoro-  
     (**trimerization** of)

IT 368-66-1, s-Triazine, 2,4,6-tris(trifluoromethyl)-  
(preparation of)

RN 368-66-1 HCPLUS

CN 1,3,5-Triazine, 2,4,6-tris(trifluoromethyl)- (9CI) (CA INDEX NAME)



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